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EDITORIAL NOTES.

Miners' Leaders Nervous.

"IMITATION" is said to be "the sincerest form of flattery." But it is not always accepted as such by those who are imitated; there is sometimes danger in being copied. The Executive of the Miners' Federation find themselves in some embarrassment owing to the miners having learned to say "No, no," as their leaders have been doing for months past. They have said "No" to the recommendation of the Executive that they should accept the churches' formula for a settlement; and the "leaders" consequently find themselves in an unenviable position. It really matters little that the miners have said "No," because there are other people concerned who had previously said "No" to certain of the components in the formula—such as a resumption of the payment of a subsidy by the nation, and the condition of the Federation that arbitration should be on the "boom" values which will prevail temporarily after the stoppage is over. However, the "No" of the miners means that they now call upon the Executive to justify their original policy of no reduction of pay, no lengthening of hours, no district agreements, and no arbitration. That is the policy upon which the men were called out and have suffered the losses of three-and-a-half months' idleness, and there is now danger of a revolt against the Federation if they cannot justify their policy. The churches' formula was something which it was hoped by the stubbornly foolish Executive would open a way for personal escape. They have less thought for the men than for saving their own faces and keeping intact the Federation, which they see is now seriously menaced. The rejection of the formula is also a warning to men not to be meddlesome and interfere in a matter which they do not understand, and, in fact, are ill-equipped for understanding.

In the present grave situation for the Federation, there seems to be, as all through the piece, nobody who counts but Mr. Cook. The Federation appears to be Mr. Cook; and Mr. Cook the Federation. His is practically the only voice that is heard. Even now he declares that the men will not go back to work unless it be all together; and he warns the Government that they had better meet the men's "leaders" (in whom the men are fast losing confidence) with a declaration that they will abandon the policy of longer hours, accept the principle of a national agreement and a national minimum, and be prepared to realize the reorganization of the industry. The first thing that really requires reorganization is the Federation, if it is not swept away altogether in the threatened avalanche of rebellion; for a more incompetent set of bunglers a large labour organization never possessed than the Executive of the Miners' Federation have proved themselves to be. Their blindness and errors of ignorance have been proved over and over again, and have been persisted in not only for months preceding the stoppage, but for the last fifteen weeks of idleness. Now they are confronted by the fact that there are serious breakings away by the men, despite the week-end efforts to induce them to remain in the Federation-created *cul de sac*. Many more have returned to work, on the eight-hour standard, and local agreements are being made. The result of the delegates' conference at the beginning of this week will either prolong the idleness, or send the men back helter-skelter; it will depend much upon whether the Federation Executive can find a fresh means of hoodwinking the men.

Meanwhile the miners are learning new facts. One was supplied by Dr. Bowie at the British Association meeting. He showed that the miners had lost in wages, through industrial disputes since the formation of the Federation, a sum which would have enabled them to buy up lock, stock, and barrel the whole of the collieries in the country; and the community have lost, through the policy of the Federation, at least four times the present-day capital value of the collieries. That is something for the men to ponder over. Another thing—this revealed by the Board of Trade returns—is that up to the end of July about 3 million tons of coal have been imported, despite the "joy rides" of Messrs. Smith, Cook, and Co. to the Continent to stop the sending of coal to this country; and, further, the British coal miners, through their Federation, have allowed £14,000,000 of coal orders to go elsewhere—representing work lost to the British miners. At the same time there are Continental sellers who have only been accepting orders on long-period contracts. What these things will mean to the British miners, they had better consider, and, having done so, as Mr. Cook has appealed for a new move on their part, they had better make one by sending him and his colleagues out of business so far as the coal industry is concerned.

The Chief Electricity Commissioner Looks Ahead.

WE are filled with admiration for the Chief Electricity Commissioner (Sir John Snell) after his Presidential Address to the Engineering Section of the British Association. It was frank; and it invites thought over some of its omissions. To all intents and purposes, the address was a defence of the policy of the Electricity Commissioners and of that of their august followers—the Government. The deliverance, being *ex cathedrâ*, could not well be subject on the occasion to the criticisms of Sir John's compeers in the electrical industry. From the address (extracts from which were published last week), it is seen that the growth, in 46 years or thereabouts, of the industry over which Sir John and his colleagues are henceforth to have greater surveillance is represented by 7000 million units. In the next fifteen years, according to recent Government publications (for which no doubt Sir John is largely responsible), it is reckoned that the business it has taken 46 years to build up will be trebled—that is, it will reach 21,000 million units. It seems that a goodly proportion of this will depend upon the electrification of the railways; but we rather think the railways will prefer to keep the generation of their electricity requirements in their own hands, in order to maintain better control in the event of labour disturbances. If all works out consistent with plan, and electricity is in future commonly generated at 20 p.ct. efficiency, the 21,000 million units will be produced from, we calculate, about double the quantity of coal expended in the production of the 7000 million units; or, roughly put, about 1500 units per ton of coal will be the future production on a 20 p.ct. efficiency basis. Domestic consumers can to-day obtain 20 to 25 p.ct. efficiency in heating from the direct utilization

of coal. Purchasing the 1500 units of electricity generated from a ton of coal, at 1d. per unit, the consumer would pay £6 5s. for 51·18 therms, or between 2s. 4d. and 2s. 5d. per therm! Most people will prefer to buy coal, gas, or coke.

The Chief Commissioner did not present details in this form. He gave to the assembled scientists total figures; and they were left to make their own deductions. Doing so, they will arrive at the foregoing conclusions and others, which point to expensiveness for domestic purposes—perhaps not to Sir John and his fellow Commissioners, but to the mass of the people, upon whose satisfaction both gas and electricity for future progress must rely. Sir John went on to tell the scientists that the consumption of electricity per capita on housing estates where electricity has been extensively, but not wholly, used for heating, cooking, and lighting is 1100 units per annum, or 5500 units for each household. When electricity is the sole agent, the consumption per capita, he states, is over 2500 units, or equivalent to 85·3 therms. Multiplying those units by 5, we get for each average house 12,500 units, or 426·5 therms per annum. With these figures before us, we begin to pity the working man with a big family, if compelled to employ electricity; and we commend the figures to the Labour Party in the House, who have been almost electricity mad in their propaganda, despite the large labour employment which the gas industry gives. If we divide the per capita consumption of 2500 units by 85 therms (Sir John's own figures), it is found that 29·4 units are required to equal 1 therm, which correspond to the figure we have already obtained of 2s. 5d., or thereabouts, per therm, charging the electricity for whatever purpose it is used at 1d. per unit. The per capita consumption of 2500 units for all purposes costs at that price £10 8s. 4d. per annum; per household of only five persons, £52 1s. 8d. We leave those figures for digestion by those concerned.

However, we can give Sir John credit for more gumption than some of the writers in the electrical papers possess. He does not for a moment imagine—big as are his expectations for the next fifteen years—that Great Britain is going to be domestically electrified to the exclusion of all other agents. Assuming that the population will grow in that period to 50 millions, also that the country is domestically electrified throughout, and that the consumption of electricity per capita is 2500 units a year, that would mean 125,000 million units; and at an average generation of 1500 units per ton of coal (which would be magnificent continuous working), the coal consumption of the country for domestic purposes only would be nearly 83,500,000 tons, against the 34,280,000 tons which the annual report of the Secretary of Mines for 1924 stated was the amount of raw coal used for domestic purposes. Whence are the millions of tons saving to come which have been predicted would arise from domestic electrification?

Furthermore, it is found that Sir John agrees that, while the amount of electricity that will be consumed depends very much on the price (which on his own figures will be prohibitive for the bulk of the people), it is not the only factor. Reliability of supply and of appliances, availability of appliances, and competition from other sources of heat have to come in the reckoning. The reliability of supply and of appliances may be—and they are—of higher standard with other means of heating than with electricity; and it is an open question whether concentration of generation and the intervention of a big network of transmission lines are going to improve reliability for electricity, as compared with local generation and distribution. We notice, among minor points, that in other comparisons the Chief Electricity Commissioner accords to modern gas fires 55 to 60 p.ct. radiant efficiency; and 10 p.ct. for convection. Seeing that the products of combustion only account for between 20 and 25 p.ct. of the heat of combustion, we think he might be generous enough to give another 10 p.ct. or so to convection; and thus allow us to have a shapely heat balance. It is also observed that he quotes the heating efficiency of electric radiators as 100 p.ct. That only refers to a winter requirement; domestic electrification incorporates much else. He might have told the scientists more about the efficiencies of electric cookers, or the hotplates on which the greatest amount of all-the-year-round cooking would have to be done; also something regarding the time and heat efficiencies of water heating. But probably time would not allow him to do this, and so add to the interest of his per capita and per household consumptions. However, Sir John is not so foolish as to suppose that electricity is going to knock out gas. As a matter of fact, he gives gas credit for a future which will do more than electricity in displacing raw coal for domestic heating purposes. We think he is right in his indications that for both gas and electricity there are in the years ahead large places in our daily system. Coal carbonization cannot be dispensed with, and therefore gas must be produced in order to obtain other essentials to our daily existence.

Another feature of the address was a discussion of the question of the combination of gas and electricity undertakings. There is little advantage to be gained from controversy now, seeing that the Government have committed the country to a generating policy which would prevent any such combination, other than to a limited extent where local generation could be accomplished at a cheaper rate than bulk supply. Sir John treated of the matter from the fuel point of view. The gas industry, except for small electricity outputs, would not dream of utilizing 500 B.Th.U. gas for generation; and large, constant customers for coke would not probably in the time to come be charged 27s. 2d. a ton for it, though not a few electricity undertakings were last year paying more than that per ton of coal delivered. Sir John knows as well as we do that the economics of combination are not based on fuel alone; that the combination of the two commodities in a single business would produce other economies, which could not be realized by separate concerns. Had the large electricity and gas undertakings been developed together, instead of being established separately and developed totally disunitedly, it may be that a very different condition of things would now have been presented, to the advantage of our urban communities. There are still places where combination is feasible; there are many where the gas undertakings could with benefit become the purchasers of electricity in bulk and purvey the supply where an electricity concern, separately run, would have a very thin existence.

The address of the Chief Electricity Commissioner, the points in it having his imprimatur upon them, is one of great interest—and value. The statements, to say the least, are generous from several aspects.

Optional Rates for a Transitional Period.

We thank Mr. C. S. Reed, the Rate Consultant of the American Gas Association, for his elucidatory letter, which appeared in the "Journal" last week, on the subject of "Three-Part Gas Rates," and hope that, in the light which it affords, Mr. George Evetts will return to the question, in continuation of his contribution to our issue for July 7. Scientifically computed and constructed tariffs form a subject which is gaining in interest in this country, and imperatively so through the force of circumstances which did not obtain at one time, and which allowed the flat-rate system of charging, which does not do level justice as between consumers, to continue unchallenged so long. With the greater part of Mr. Reed's letter, no doubt Mr. Evetts will deal. The last paragraph contains a point relating to policy. We believe there must be a transitional period before there is compulsory levying of a new method of charge, and, during that period, the rates must be optional. Mr. Reed states that optional methods for domestic business have not proved satisfactory in the United States. We can agree with that if the old method of a flat-rate charge in all circumstances is allowed to be permanent. He gives the information that a number of companies in the United States have been using optional schedules for more than ten years, and yet 90 p.ct. or more of their domestic consumers are still on the old straight rate. The reason for this he believes is that on a flat rate about one-third of the customers fail to pay the bare operating costs necessary to serve them; another third, while paying operating ex-

penses, do not pay the full fair return; and the remaining third not only pay their own costs of service and a return on the property used in supplying them, but also contribute to the defects caused by the other two classes. This third class of consumers must be protected. The injustice they suffer under the two or three part tariff is emphasized under the flat-rate system. The only way to protect them is not by the institution of permanent optional tariffs, but by insistence on all domestic business being done on a basis which will cause every class of consumer to pay their fair proportion of charges; and such a system—providing for an automatic reduction of average charge the higher the consumption rises—is better for those whose consumption at the present time is of a non-paying order, equally with those whose custom does pay, but who can increase it for a moderate payment per unit of additional consumption. All the same, we do not believe in revolutionary methods in this matter, and therefore think that optional tariffs for a limited transitional period should be established.

A Dereliction of Duty.

There are representatives of local authorities who seem, in these times, to be totally oblivious of, or deliberately hostile to, the administrative purposes for which they were appointed. Those purposes consist of looking after the interests of the community to the best of their ability, and not subordinating them to any political object or trade dispute, however strong may be their sympathy with one party or the other to the difference. The sympathy, if it is desired to show it, should receive expression outside their duties as members of the local governing body. Municipal gas-works, for example, have nothing whatever to do with the miners' dispute. The duty which the community (of which miners are only a part) expect of the administrators of such works is to keep them running, and to supply all who desire it with the gas that is required, by whatever means are available. That duty must be, or should be, wholly dissociated from any personal bias or feeling there may be in respect of the dispute in the coal-mining industry. A majority of the members of the Wigan Corporation and the Ashton-in-Makerfield District Council hold contrary views. They have decided that the communities whose affairs they are supposed to administer, defend, and advance must go short of gas and suffer low pressures at certain times of the day, because the Councils refuse to purchase foreign or "scabbed" coal, notwithstanding that it is available. Although there are a large number of miners idle in these areas, that is no reason why the community generally should be deprived of a supply of gas, if it is possible to obtain it. How the miners are to benefit from the course adopted by the Councils, we fail to see. The people of Wigan and Ashton-in-Makerfield may be put to no end of inconvenience in respect of gas for light, heat, and power, but it will not make an iota of difference to the issue in the mining dispute. Apart from the decision of the Councils being a dereliction of administrative duty, and an act of disloyalty to the trust reposed in them, if the course they are pursuing will not be of any advantage to the miners, then what they are doing is a senseless proceeding. We are surprised at members of the Councils having so little appreciation of the dignity of their position and of their duty. Such councillors ought strictly to carry out their principles, and go without bread or other food which require heat to cook it, seeing that much of it is baked and prepared by imported fuel, or the products of such fuel. There seems to be a lack of commonsense and courage, and a low order of administrative principles ruling in some local bodies; but thank goodness the major part of our local authorities in this country have less foolishness and a higher sense of duty in their constitution. We are surprised at the Wigan Corporation, whose gas undertaking has always held an honourable place in the gas industry. We hope that, if any local manufacturing firms suffer damage through a shortage of the supply of gas to which they are legally entitled, and can prove an availability of coal for gas-making purposes, they will look into the question of making the councillors responsible for the damage. The Walthamstow Council were recently fined for depriving customers of a supply of electrical energy, through submitting to trade union instructions.

Limiting Profit Appropriations in Aid of the Rates.

It may not have been generally observed, but it looks as though at length we are coming on to definite lines in respect of rate-aid appropriations from the profits of municipal trading undertakings. The Fifth Schedule of the Government Electricity Supply Bill is creating a precedent of more certain order than anything which has hitherto appeared in isolated local authority Bills. It provides for a straight-cut regulation of appropriation; and to that extent it does better justice to electricity consumers than the power of unrestricted profit appropriation. In the controversies of the past over this matter as it affects municipal gas concerns, our attitude has been that any deficiency of net profit which the ratepayers have been called upon to make good in connection with an undertaking should be repaid by it, but beyond that any available surpluses of profit, after due provision has been made in respect of the financial stability of the undertaking, should be devoted to its benefit, or to that of the consumers. A municipal utility undertaking should be, as far as possible, developed from its own resources to render the best public service at the lowest cost.

The schedule referred to in the Government Electricity Supply Bill does not go so far as that, though we maintain that, in the interests of electricity—as would be the case in those of gas—it would have been better to cut out once and for all the vicious system of appropriating profits made from one section of the ratepayers for the benefit of the whole number, and follow the principle of "every tub standing on its own bottom," than to try to pursue a middle course, and so do an injustice, limited though it be. What is provided for in the Bill in respect of municipal electricity undertakings is that "the amount which may be applied in aid of the local rate in any year shall not exceed 1½ p.ct. of the aggregate capital expenditure on the undertaking; and after the 31st day of March, 1930, no sum is to be paid in aid of the local rate unless the reserve fund amounts to more than one-twentieth of such aggregate." In the interests of financial stability, there will be strong approval of the second part of the clause, but a less favourable endorsement of the first part—except by those inveterate profit appropriators who will be glad to find that there is not to be a total extinction of their power. Frankly, we wish, and most of the officers of municipal gas undertakings will concur, that the gas industry had got as far as this, through Government decree, in connection with municipal gas supply.

This advance in definite limitation shows that the old controversies have had good effect in bringing us well on the road to the goal of total prohibition of the utilization in this manner of the profits of municipal trading undertakings. The hoary argument that the pledging of the ratepayers to make up any financial deficiency from the trading of a gas undertaking entitles them to perpetual relief of rates from net profits has been tottering severely for two reasons. The first is that, in the case of gas undertakings, there has been little call upon the ratepayers (the same cannot be said for all electricity concerns) to make up financial deficiencies; and the second is that the libertines in this matter—those who hold that profits from municipal trading undertakings should be plentifully devoted to the relief of the rates, and not to the reduction of the costs of the service—have in some cases appropriated to that purpose as much money in the aggregate as has been required for the purpose of liquidating capital. This has been distinctly unfair to the gas consumers, who have had to pay interest on capital, provide the money for sinking fund, and pay the rates and taxes of the undertaking. The system of extracting from them additional money to aid the rates causes them to become super ratepayers. This has been a providential thing for some electricity undertakings, or they might now have had to meet the competition of gas free from but a pittance of capital obligation. Those electricity undertakings have therefore

ground to be thankful for a system which has prevailed, but against which their officials and many of their committee men now inveigh, in the interests of their undertakings, with the same ardour as did gas men of old. In the past there has been many an attempt to abolish altogether the rate appropriation system. It is not permitted in Scotland. In some cases in England, there has been success to the extent of providing some limitation. Perhaps the greatest protagonists in this matter have been successive Chairmen of the Manchester Corporation Gas Committee, and, could they have had their way, we see no reason why the gas undertaking should not have been now practically free from capital debt, and supplying the city with gas at a lower price than it is doing to-day—to the advantage of the public in respect of both their pockets and their health, for much greater strides would have been made in the use of gas as a fuel, accompanied by a reduction of the atmospheric pollution.

Parliament, some years ago, showed a distinct tendency to abolish profit appropriation in aid of the rates; but the idea of a limitation took the place of complete prohibition—this being a sop to appease the municipal governors who showed a strong resistance to the abolition of a practice to which time and parliamentary enactment had given sanction. However, as we say, the Government Electricity Bill is the first occasion on which limitation has been applied (as this will be applied with the development of the scheme) generally to an industry; and, in four years from now, not even an appropriation from net surpluses equal to 1½ p.ct. on the aggregate capital expenditure of an undertaking will be allowed unless its reserve fund amounts to more than one-twentieth of such aggregate. When this becomes law, and is operative, it will be unfair to municipal gas undertakings in competition with municpal electricity concerns, if the same rules are not applied to appropriations from gas profits. Otherwise, it is easy to see that the 1½ p.ct., or, in the event of the reserve fund not standing at the prescribed sum, no percentage at all, may be observed in the case of electricity, while big sums may be taken from the competing gas undertaking.

Balancing Function of Producer Gas.

The question of flexibility in gas production will insist upon projecting itself more and more upon the notice of gas men through the tendencies of business development, which claim that production shall promptly respond to demand without throwing out of gear all the gas consuming appliances in a district. Attention was called to this in a recent editorial article, based upon a patent specification in which Messrs. Humphreys & Glasgow are concerned. Not long since, too, Mr. G. M. Gill drew attention, in a short article, to a heavy-oil gas-making process which he thought might prove valuable as an auxiliary in meeting peak demands (see "Journal" for June 2 last, p. 451). Last week Mr. R. G. Shadbolt contributed an article dealing with the more recent editorial and patent specification. We were all much younger when Mr. Shadbolt first called the attention of the gas profession to the value of producer gas as an ally in town gas manufacture. We were rather inclined then, when Mr. Shadbolt was not within earshot, to say certain derogatory things as to the utilization of a gas containing such a large quantity of "ballast." But now producer gas as a balancer of quality and specific gravity claims a place in the constitution of conditions which will confer a large flexibility upon gas production. The argument, experiences, and illustrations which Mr. Shadbolt packed into the short article last week should be closely studied.

Combination in the German Gas Industry.

According to the annual report of the Committee of the German Gas Association, the gas industry in that country is commercially fully organized. Through different bodies, coke is sold and exported to the best advantage, tar is disposed of to distilleries and in other ways, other bye-products are handled in bulk, and the interests of the industry in the fertilizer market are safeguarded. A branch looks after the purchase of stores; and a subsidiary company undertakes gas-works insurance business.

Meter Fixing and Testing Irregularities.

The notice of gas undertakings has already been called to the fact that the fixing of meters which are not officially sealed is a contravention of section 13 of the Gas Regulation Act. The Board of Trade and the Institution of Gas Engineers have both dealt with the subject. The Association of Statutory Inspectors of Gas Meters have also been discussing it (*ante* p. 327). The Council state that should any evasion or irregularity come to light after a reasonable period has elapsed, the necessary action to be taken by the inspector appears to be clearly defined by the Board of Trade. Another matter is that certain authorities have appointed inspectors who have not proper certificates. This is also a contravention of section 14 of the Gas Regulation Act. Through the action of the Association, the Board of Trade have taken steps to regularize this. It is just as well, in the interests of both gas suppliers and consumers, that the decrees in these respects should be strictly observed.

Coal Stoppage and Trade.

According to preliminary figures published in the "Board of Trade Journal" regarding trade in July, the indications are that our manufacturers and traders are successfully accommodating themselves to the stoppage of fuel supplies from British mines and to the use of imported coal and fuel oil. Compared with June, imports show an increase of £2,786,200; while exports have gained by £7,156,600. Imports were higher than in July last year by £1,845,000; but in exports the decline was £7,562,500. Coal exports largely account for this; the value of the shipments of manufactured goods being only £2,407,600 lower than in July, 1925. Coal, in fact, accounts for the major variations in the returns. Raw material exports (of which coal is by far the most important) show a loss for July of £4,570,100; but the imports of raw materials were higher by £3,199,000 than in July, 1925—due no doubt to the purchases of coal abroad.

Wholesale Prices and Imported Coal.

The "Board of Trade Journal," in its monthly analysis of wholesale prices, states that the movement in July shows an increase of 1·6 p.ct., compared with the general level in June—the index number for July being 89·5. The calculation is inclusive of allowances for the high prices paid in the two months for imported coal. The June index number (88·1 p.ct.) includes an average rise of 25 p.ct. in coal prices compared with the prices ruling previous to the stoppage at the pits. During July imported coal was used in increasing quantities; and it has been ascertained that during the month the prices averaged about 100 p.ct. above pre-stoppage rates. The turnover has been on a scale much below the normal, and, taking this into account, an average increase of 50 p.ct. in the ten price indices dealing with coal, over their values before the stoppage, appears likely to express the position approximately.

Mistaken Labour Politics.

Mr. Havelock Wilson was about right when he stated the other day that one of the greatest misfortunes that ever overtook the Labour movement was when it entered into politics. He also asserts that the trade unions to-day are in a very serious condition; that after the general strike nearly every union was in a bankrupt state; and that now hundreds of thousands of men have declared they will never pay any more into their unions. They see that it is a fool's game to do anything to injure the machinery which gives and creates employment. The unions do nothing whatever to help to build-up employment; and many trade unionists are now utterly sick of being subservient to men whose business it is—and who have shown themselves highly successful at the mischievous game—to wreck work, and not to create it. Many trade unionists are resolved not to be led again into a general strike without the previous sanction of the men. At the Bournemouth meeting of the Trades Union Congress, a resolution is to be submitted which will emphasize the desirability of not permitting the General Council to order a stoppage of work unless a ballot has first been taken of the affiliated unions. Notice has been given of other resolutions bearing upon the same subject. What is wanted is a thorough combing-out of the destructive element from the counsels of the unions.

Improving Existing Houses.

Gas undertakings supplying in rural areas should keep an eye upon the Housing (Rural Workers) Bill. Its intention is to bring old houses in the country up to modern standards of comfort and sanitation where they are substantially built. Mr. Neville Chamberlain explained to the House the other night that the Bill will enable local authorities to submit for the approval of the Minister of Health schemes for the improvement of houses; and it will empower local authorities to give assistance by way of grant or loan, or both. But this is only to be allowed in the case of houses the value of which, after alteration, does not exceed £400; and it will only be given where the total cost is less than £50. The operation of the Bill is limited to five years. Gas can considerably improve the comfort and conveniences of such houses.

PERSONAL.

We congratulate Mr. GEORGE ROSS, head of the firm of Charles Ross, Ltd., Constructional Engineers, of Sheffield, on his award of the B.A. Degree, with honours, of London University.

Mr. JOHN EARP STOKES, of "Laureath," Hednesford Street, Cannock, was unanimously elected Chairman of the Board of Directors of the Ogley Hay and Brownhills Gas Company, Ltd., on Friday, Aug. 13, in place of the late Mr. Thomas Vaughan, of Willenhall.

OBITUARY.

The death has occurred, at the age of 54 years, of Mr. FRED WHITELEY, of Holmfirth, for many years a Director of the Holmfirth Gas Light Company.

FORTHCOMING ENGAGEMENTS.

[*Secretaries of Gas and Kindred Organizations are asked to assist in making this diary of events as complete and useful as possible by sending the earliest intimation of all meetings.*]

Aug. 24.—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS (EASTERN DISTRICT).—Meeting at 28, Grosvenor Gardens, S.W. 1, at 2.30.

Sept. 2.—NORTH BRITISH ASSOCIATION OF GAS MANAGERS.—Annual meeting at Glasgow.

Sept. 6-18.—SMOKE ABATEMENT EXHIBITION, at Birmingham.

Sept. 9-10.—CERAMIC SOCIETY.—Meeting of the Refractory Materials Section, at Leeds.

Sept. 11.—GAS SALESMEN.—Annual meeting at Birmingham.

Sept. 14.—NATIONAL GAS COUNCIL.—Meeting.

Sept. 14-16.—INSTITUTION OF PUBLIC LIGHTING ENGINEERS.—Conference at Newcastle.

Sept. 15.—FEDERATION OF GAS EMPLOYERS.—Meeting.

Sept. 16.—MIDLAND ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—Official visit to the Smoke Abatement Exhibition, Birmingham.

Sept. 20.—EVENING STAR LODGE.—Emergency Meeting.

Oct. 25, 26, 27.—BRITISH COMMERCIAL GAS ASSOCIATION.—Annual conference at Newcastle-upon-Tyne.

Feb. 16.—"B.C.G.A." MIDLAND DISTRICT CONFERENCE.

INSTITUTION OF GAS ENGINEERS.

Sept. 13.—Emergency and Finance Committees.

Sept. 14.—Advisory Committee on Education.

Sept. 20.—Council meeting.

Sept. 21-23.—Postponed Annual Meeting.

Sept. 24.—Visit to Hastings.

ELECTRICITY SUPPLY MEMORANDA.

THE Electricity Bill, as amended in Standing Committee, has been published. The principle of the scheme which it is intended to carry out for the country remains unscathed; only in methods of procedure has there been any change. It remains now for the House of Commons to deal with the measure on the report stage, and then to give it third reading. This will be done in the first few days of the autumn session; and, immediately afterwards, the House of Lords will be expected to pursue the autocratic lines which have applied throughout the passage of the measure, and to put it quickly in a position to receive the Royal Assent. There is no disputing that a ponderous piece of machinery is being created, the like of which has no precedent in this or any other country for producing an entirely new system for what is now an old-established industry. The change-over is not going to be accomplished without an extraordinary expenditure of money; and the new machinery will not be run without also imposing a heavy and unusual expenditure upon the industry. Instead of advancing the interests of the latter, the chances seem to weigh in the direction of what is being done acting as a clog upon its progress. If the scheme had the endorsement of a majority of the technical men of the industry, it would be easy enough to say the Government had done the right thing. But it has not. It is the conception of the few, who have managed to hypnotize the Government, who have forced the scheme through against the strongest force of opinion the electricity industry itself could produce. It has been a peculiar proceeding from beginning to end. Now that the Bill has been amended so far as the Government would permit, there is no more satisfaction among electrical men than there was before; and the Government have the knowledge that they are imposing upon a public utility industry something which has gained no, or little, belief in its promised efficacy, and is acutely resented. The development of the scheme will be carried on with unwilling participants; and the Government should realize what that will mean. As to its effectiveness, the address of Sir John Snell at the British Association meeting, when analytically examined, should disclose to all concerned that the plans are speculative to the topmost degree. The "Electrical Review" winds up a comment upon the Bill as it now stands with the words: "The principle on which the Bill is based remains untouched; it establishes a 'middle man' in the electricity supply industry, with unprecedented powers, and with authority to spend borrowed capital up to a limit of 33½ millions sterling, on which the industry, with the help of the consumer, will have to pay interest and sinking fund charges." That is not by far the whole of the expenditure that will be involved. The outlay on the super-stations and the scrapping of plant representing capital will together make very many millions; and the industry will be, despite the provisions for arbitration, under an unprecedented absolutism. Arbitration will always have brought into it expediency as affecting the scheme; the interests of the scheme will always be paramount to local interests. In the circumstances, arbitration has not the open meaning which has hitherto been attached to it. That which Parliament has given, Parliament is taking away. Will the scheme, the "Review" still mournfully asks, give us cheap electricity? The putting of the question implies a profound doubt, which we, outside but interested observers, may also be permitted to share.

Still Unacceptable.

Doubts and Fears.

The "Review" points out that the most fundamental alteration which has been made is to constitute the Electricity Commissioners the technical advisers to the Central Board. The former will prepare schemes; the latter, if they adopt them, must carry them out. The Board will have to be constituted of supermen, for they will have to carry on a business of gigantic proportions. They will have to buy and sell electricity wholesale, and make sufficient profit to cover all expenses, including not only the cost of administration, but the capital charges on the main transmission lines and such standardization of frequency as may be carried out. Their salaries and those of their staff will not be light, with appended provision for pensions and gratuities. Upon all this the expectation is that the charges to the consumers will be reduced. What an expectation! It is good to expend large sums of money to produce profitable economies; but there must be fair assurance first that the economies will be there, and that they will be of a profitable order. Nothing of the kind has been done here. It is simply speculation, and imagination as to what may happen. And the imagination of what is likely to happen takes opposite views—that on which the scheme is founded being the lesser quantity. The "Review" approves the changes which have been made to submit to arbitration cases where it is felt there will be oppression. But despite the changes, these words of our contemporary are significant: "These provisions, we hope, will serve to protect the rights of authorized undertakers against oppression, the fear of which, though possibly groundless at the moment, cannot be regarded as illusory in view of what the future may bring forth." The "Review" finds satisfaction in noting that the Board are now required to bear the cost of any consequential alterations of switchgear, &c., that may be necessary, disputes on which score, as well as the determination of the cost of the standardization of frequency (which the Board must bear), are now subject to the final decision of an independent arbitrator. Subject also to arbitration is the provision enabling the Board to require an undertaking purchasing a bulk supply to take the whole of its supply from them. To arbitration may also be

referred the exercise of the power of the Electricity Commissioners—in the case of a station which cannot generate more cheaply than the Board can supply it in bulk—to require the owners not merely to lower their charges, but actually to order them to take a supply in bulk, and shut down their plant. We do not suggest there will not be fair arbitrations; but we do say the factors which will be taken into consideration in the arbitration will include expediency in relation to the full development of the scheme. We are not surprised at the cloud of dubiety that to-day hangs over the electricity industry in relation to the scheme.

Economy of Intimate Production and Sale.

Any electrical neophyte ought to be able to see that the shorter the connection between the power station and the load, the less is the liability to interruption of the supply. But the point does not appear to have been impressed upon the Government—indeed, they do not seem to have considered in any shape or form the huge responsibility they are taking in their work of generation concentration and long-distance transmission. They are crowding the eggs into a few large baskets, and that is very undiplomatic. The "Electrical Review" has done good service from time to time in making disclosure of conditions in America, which has done much to discount the arguments based on American practice that have been advanced by the supporters of the Government electricity scheme in this country. What our contemporary has shown is that the representations have not been altogether guileless. Attention is called in a recent issue to a broadcast address by Mr. Arthur Williams, one of the Vice-Presidents of the New York Edison Company. He has explained why the great Edison power stations—even the most recent—are situated within the city limits, instead of being built near the coal mines. Mr. Williams considers that a continuous, unlimited electrical service is more important than that of cost. Long-distance transmission, he says, is not sufficiently free from risk of interruption to permit of operation without local steam stand-by stations within the city. Moreover, the immense quantities of water required for condensing purposes are not available on the coal-fields; and it is not safe to rely upon a single group of mines for a continuous supply of coal. The "Review," commenting upon this, refers to the assurance that has been given in this country that, by the use of interconnecting main transmission lines, the degree of reliability attainable is so great that stand-by plant can be reduced by 10 p.ct. Then we get the words with which this paragraph begins: "It is quite clear that the shorter and more direct the connection between the power station and the load, the less is the liability to interruption." Further, "it is unquestionably cheaper to carry coal than to transmit electricity over a long distance—in many cases, the last four words could be omitted without invalidating the statement."

Big Stations and Smaller Ones.

Following the foregoing, there is an allusion to a discussion at Loughborough on a paper by Mr. A. B. Mallinson, entitled "Justifiable Small Power Plants." In remarks made on the occasion by Mr. W. Pearson, our contemporary says, the case was stated convincingly. We extract the following from the article: He said that the claims put forward on behalf of super-stations supplying wide areas are based on three assumed advantages: Higher efficiency, lower capital cost, and better diversity factor. The last is fallacious; and up to the present no evidence in support of it has been forthcoming. Mr. Pearson cites instances showing that the load factor obtained does not depend on the size of the plant, and that the coal costs at Manchester, Glasgow, and Birmingham are no less, but even greater, than those at Rotherham, Walsall, and St. Helens; while the total working costs of the three big undertakings stand at 22, 35, and 43 in the list. The average prices charged by them are also far above those of some quite small stations. The same applies to the capital cost per KW. installed. If, says Mr. Pearson, the large modern station cannot supply near-by consumers more cheaply than the modern medium-sized station, how can it be expected to supply at a distance more cheaply than the local medium-sized stations? "In point of fact, it cannot do so; and the Electricity Commissioners have actually had to sanction the installation of modern plant in small stations, because the cost of transmission over a moderate distance has put bulk supply out of the running. Yet the national electricity scheme essentially depends upon transmission as opposed to local generation!"

Liberty in Assisted Wiring and Purchase.

Mr. S. T. Allen, the Borough Electrical Engineer of Wolverhampton (in a communication to the "Electrical Times"), makes light of the view that the "assisted wiring" policy should be regarded as an important and daring development, to be supported by a portentous paraphernalia of reports, estimates, and recommendations. To him assisted wiring is only one ingredient in a commercial policy, and that policy should inspire a coherent, continuous, and many-sided scheme of activity. In Wolverhampton, for example, wiring installations can be obtained by customers on any method of payment or working—whether suggested by the customer himself, or forming part of alternative suggestions emanating from the Department—if considered satisfactory from physical and commercial aspects. Installations can be hired or hire-purchased; payments being made for the latter spread over any reasonable period. A consumer may hire an installation, and be allowed to purchase it at a written-down price at any time. If he obtains the installation on a hire-purchase system, he can buy it up at any time, saving for himself the interest which would accrue if he maintained the hire-purchase payments during the whole period originally arranged for. There are no restrictions with regard to the types of installations which may be hired, hire-purchased, or sold direct as long as they are all recognized systems, and the work is carried out, or approved, by the Department. We believe in considerable liberty in the methods of business development; but there should be some amount of system incorporated, otherwise we can see that there must result a great deal of complication in the book-keeping of the Department; and some consumers may be "assisted" more than others. At the same time, it is easy, from experience in the gas business, to agree with Mr. Allen that it is very unlikely any one scheme adopted in any one town will create by itself the greatest amount of business. It is much better to adopt a broad-minded policy than to commit an undertaking to that which will prevent the fullest range of development in the future.

From Municipal to Private Administration.

It appears that in America municipal trading in electricity is gradually being changed over to company management. We learn from an electrical contemporary that a survey has recently been completed by the National Electric Light Association which supplies the intelligence that last year 269 U.S.A. cities closed down or sold to private companies their municipal electricity stations. This transfer of interests makes the total of abandoned or transferred municipal electricity plants 1129 during a period covering a little more than five years.

NOTES ON NEW BOOKS.

THE DISCOVERER OF GAS LIGHTING.*

In this attractive little volume, printed in excellent type and adorned by numerous interesting illustrations, Mr. Layton has set up with pious hands a worthy and well-deserved memorial to a man whose name is familiar to all who have interested themselves in the history of gas lighting. It is in the calm and uncontentious spirit of a historical scholar that Mr. Layton has betaken himself to finding out what was possible about John Clayton; and, though he does much to elucidate the facts relating to Clayton's particular observations on coal gas and to confirm his claims as a discoverer, the author has taken chief pains to make Clayton appear as a living person. To this end he has devoted much time and skill, and has achieved admirable success, giving us such detail as was procurable about the family relationships and life of Clayton, and suggesting in a picturesque way the conditions of the time in which he lived. It is excellent to have such a restoration of the man of whom it can be said, in Mr. Layton's words, "It appears to be beyond question that he was the first to record the fact that the distillation of coal would produce an illuminating gas that could be collected and stored for future use."

It was within a year or two of 1684 that Clayton, then in his twenties, had his attention drawn to the ditch near Wigan where, in 1659, Thomas Shirley had shown that there existed a spring of natural gas. Clayton having with some difficulty got to this gas, and observing "that there had formerly been coal-pits in the same close of ground," proceeded to get some coal from one of the nearest pits, and distilled it in a retort in an open fire. He observed that, in addition to a phlegm (gas liquor) and a black oil (tar) there arose also a *spirit* that he could not condense. This spirit he could light, blow out, and rekindle. He filled bladders with it, and by pinpricks and compression was able to get jets of flame with which to divert his visitors.

Clayton communicated these observations to the great Robert Boyle in a letter which only appeared some fifty years after it was written in the Philosophical Transactions of the Royal Society for 1739-40, after a copy of the original letter had been found by the Bishop of Cork, Clayton's son, and sent by him

* "The Discoverer of Gas Lighting. Notes on the Life and Work of the Rev. John Clayton, D.D., 1675-1725." By Walter T. Layton. Foreword by Dr. Charles Carpenter. viii., 56 pp. (London: Walter King, Ltd.; price, 2s. 3d., post-free.)

to the Earl of Egmont, who was a Fellow of the Society. In a later communication, written in 1688 (and published in 1693) to the Royal Society, Clayton, recording some observations on natural phenomena in Virginia, referred incidentally to his experiments on coal gas, adding to what was contained in his letter to Boyle the important fact that the gas from coal could be passed through water without losing its inflammability.

It seems strange that there should have been such a long delay in the publication of Clayton's letter or that his observations should not otherwise have been made known. Boyle busied himself much with "æriform fluids" and with flame; he was alert to notice contemporary discoveries, and scrupulous in according credit to discoverers. It is true that his chief publications on these subjects were made before 1684, but he was active in science until his death in 1691.

It requires an effort to get one's mind back to an appreciation of the state of scientific knowledge in the days of Clayton, and to realize the mystery that then surrounded the gaseous state of matter. The notion of there being individuality in gases was only just beginning to supersede the belief that there was only one "air," and that such variations as had been observed were due to a mere modification of its qualities. That a completely inflammable and permanent air or "spirit" could be obtained by heating solid coal was evidently to the Royal Society an unknown fact in 1740, and the demonstration recorded in Clayton's letter must have ranked as something very remarkable.

A good deal has been written about the beginnings of gas lighting. We have Mr. Charles Hunt's admirable "History of the Introduction of Gas Lighting," published in 1907, and, more recently, the lively volume of M. Adry of Antwerp (see "GAS JOURNAL," Dec. 23 and Dec. 30, 1925). The apportionment of credit for the establishment of coal gas as an illuminant has been, and is no doubt likely to be, a subject of periodic discussion. Such questions lend themselves readily to disputation and especially enlist national pride, and sometimes also national prejudice. The scientific discoveries and inventions of the last thirty years will afford posterity material for a priority literature that baffles the imagination. Mr. Layton's book, as we have said, is far removed from the disputatious category; it is a peaceful and scholarly work, animated by humane motives, among which the author emphasizes his desire to do justice to the "clergyman-scientists" who in earlier days played no small part in discovery and invention. Nothing could be more appropriate to the book or a greater commendation than the "Foreword" written in felicitous terms by Dr. Charles Carpenter.

ARTHUR SMITHELLS.

PHOTOMETRY.*

"Photometry," by J. W. T. Walsh, who is Senior Assistant in the Photometry Division of the National Physical Laboratory, is to our mind the finest English work which has ever been published on the subject. The author, whose "Elementary Principles of Lighting and Photometry" is doubtless well known to our readers, possesses a thorough knowledge of his subject, and writes in a style at once lucid and pleasing. It is too often the case that scientific books, though containing the necessary facts, present them in a dull and lifeless or irritatingly involved manner; and for this reason the clear and interesting way in which the information is set out in "Photometry" is deserving of great praise. Discussing the progress of photometry, the author, in his preface, mentions that nearly all the illumination photometers so widely used to-day have been designed within the last fifteen years. In the book, therefore, he has reduced to a few lines the description of obsolete or obsolescent apparatus. The principal journals dealing with gas and electrical engineering, illumination, physics, and general science published in Great Britain, America, France, Germany, and Italy have been thoroughly searched from the first year of publication, and reference has been made to every paper included in the International Catalogue of Scientific Literature published by the Royal Society. Where a paper has been reprinted, either in full or in lengthy abstract, in journals other than that in which it originally appeared, references to those journals are included. In all, there are well over 1100 major references; an appropriate set being placed at the end of each chapter. The book is illustrated by no fewer than 303 diagrams and photographs. The diagrams, which are unusually accurate and clear, were drawn by F. G. H. Lewis. There are ten useful appendixes, including a list of books published on photometry. The index to the volume, which extends to over twenty pages, is in keeping with the care which has been bestowed on the entire contents. No useful purpose would be served by detailing the latter. Suffice it to say, therefore, that the book, the general treatment of which is essentially practical, is divided into sixteen chapters, the first of which is an historical note. In the second chapter the author deals with the nature of light, and the various theories which have been put forward regarding it. He considers in turn the wave theory, the electromagnetic theory, and the quantum theory. Chapter 3 comprises a masterly account of the eye and vision. It has always been the cherished belief of the author that the practice of a branch of applied science cannot properly be carried on without some grasp of the theory underlying it, and he therefore makes no apology for inserting these two chapters. Chapter 4 is devoted to the principles of photometry, and the subjects dealt with in the chapters which follow include standards of candle-power, measurement of candle-power in a single direction, candle-power distribution and total flux measurement, heterochromatic photometry, spectrophotometry, measurement of colour, physical and illumination photometry, and measurement of brightness and of reflection and transmission factors. The final section is devoted to the fitting-up of a photometric laboratory; full directions regarding the gas equipment being given. As for the printing of the book, this does credit to a famous publishing house—which is saying a great deal.

* "Photometry," by J. W. T. Walsh, M.A., M.Sc., &c. Published by Constable & Co., Ltd.; price, 40s. net.

A HANDBOOK ON HOLDERS.

We have received from the publishers, Otto Spamer, of Heinrichstr. 9, Leipsiz, Part I. of a new work, by Ernst Broschat, entitled "Der Behälterbau" (Holder Construction). The object of the author has been to provide an instructional and permanent reference work on holders of all kinds—a subject which, in his opinion, has been almost entirely neglected in technical literature. Part I., which is under our notice, deals in considerable detail with all possible constructional materials, from sheeting to paint, from piping to rivets, with their characteristics and uses. This applies to "holders" of all kinds, as does Part II., which deals with calculations of stresses, &c. Parts III., IV., and V. specialize respectively in Reservoirs and Boilers, Tanks, and Elevated Holders, while Part VI. is devoted exclusively to Gasholders. The work is handily arranged and indexed for reference, and profusely illustrated with diagrams. The price of each part is mk. 7.50, and the present intention is to issue Parts II. to VI. quarterly.

REFRACTORY MATERIALS FOR CHAMBER-OVENS.

"Feuerfeste Baustoffe für Kammern der Kokerei- und Gaswerksöfen" is the title of a new work which the author, Herr L. Litinsky, of Leipzig, has sent us. The cost of a thorough investigation with a view to selecting a really suitable refractory is so small as compared with that of laying-off and repairing carbonizing plant, that the author feels sure there is room for his contribution to the subject. Refractory materials in general are classified, and those suitable for the object in view are fully dealt with in reference to their chemical and physical properties. Repair methods are described, and a comparison drawn between silica and fireclay, wherein, provided raw material and preparation are of the requisite standard, preference is given to the former, in spite of certain undeniable disadvantages which it possesses. Above all, it is a matter which requires expert treatment. The book, of 49 pages, in paper cover, containing 15 diagrams, is published by Wilhelm Knapp, Verlagsbuchhandlung, Halle (Saale), at the price of mk. 2.80.

ON CHOOSING A CARBONIZING SYSTEM.

We have received from the author, Herr L. Litinsky, of Leipzig, an interesting brochure entitled "Ueber die Wahl eines Gaswerksofensystems." In small compass, and in readable style, the work aims at being of assistance to those who are contemplating new carbonizing plant, but have not yet decided what system to adopt. Under the heading of a series of questions, the author lucidly discusses the pros and cons of various alternatives—"Retorts or chambers?" he asks. "Vertical, horizontal, or inclined?" "Silica or fireclay?" "Regeneration or recuperation?" And so forth, through all the problems that face the engineer in this situation. The author does not wish to lay down for him any hard and fast principles, but rather to assist him in comparing the advantages and disadvantages of one with another. The brochure, of 29 pages, with 9 illustrations, is obtainable at the price of mk. 1.50 from the publishers, Wilhelm Knapp, Verlagsbuchhandlung, Halle (Saale).

PRACTICAL GEOMETRY.*

Notice was made in "JOURNAL" for July 28, p. 194, of the publication of "Theoretical Geometry," by A. W. Siddons, M.A., and R. T. Hughes, M.A., of Harrow. There has since been published "Practical Geometry," written by the same authors. It is their intention that these two books should be used side by side. The subject-matter has been divided into two separate volumes, because past experience shows that, as the pupil advances, he will gain a better appreciation of the functions of practical and theoretical geometry if they are separated in his text-book, and that for pupils of different ages, with different abilities and requirements, the blendings of the two should differ. In "Practical Geometry" there are many *viva voce* questions to develop the pupil's power of intuition and to drive home important ideas, and there is a good supply of questions requiring calculation or accurate drawing. Throughout the book, examples in three dimensions are introduced, though solid geometry is treated more systematically towards the end.

* "Practical Geometry," by A. W. Siddons and R. T. Hughes. Published by the Cambridge University Press; price, 4s. net.

IRISH ASSOCIATION OF GAS MANAGERS.

ANNUAL MEETING.

The annual meeting of the Association was held in Dublin yesterday, under the presidency of Mr. J. O Halliwell, of Mullingar, whose address follows. Other papers read at the meeting were "The Evolution of Gas Plant," by Mr. S. B. Langlands (see p. 370); "Valuation of Gas-Works for Rating," by Mr. J. H. Allen (see p. 369); and "Notes on Purification," by Mr. H. Blakeley. The last paper will appear, together with an account of the proceedings at the meeting, in our issue for Aug. 25.

PRESIDENTIAL ADDRESS.

Gentlemen,—I take this opportunity of thanking you most sincerely for the great confidence you have reposed in me by electing me President of your Association; and I trust the work of the Association has not suffered by my occupation of the Presidential Chair.

Before proceeding with my address, I would like to pay a tribute to the memory of a distinguished member, whose sudden departure from our midst, since our last meeting, has made such a sad impression, and left a gap not easily filled. The late Mr. P. J. FitzPatrick, of Drogheda, was always present at our meetings, contributed to the success of our organization, and occupied, with distinction, the position of President in 1914. Those of us who knew him best admired him most. As a token of respect to those whom we have lost, and in sympathy with those who mourn, I ask you to rise in your places for a moment.

I have heard it said that for eleven months the position of President of the Association is very pleasant. During this time he enjoys the privileges and honours of his position. Certainly I have done so. I represented the Association on several occasions in London; and I must say that I met with a very cordial reception, being shown every kindness and consideration. Alas, the eleven months left me with the problem of my address more or less in the air. It is a problem, when so many able Presidents, most of whom have had far greater experience than myself, have already touched in masterly manner on all topics of interest to the profession. Most of the problems which have exercised our minds during the year are referred to in the report of your Committee, or (should I say?) of the Secretary. I am sure, however, I need not remind you of his great abilities.

Gas Companies and Electricity Supply.

In addressing you to-day, it is not my intention to occupy your time by any description of the towns or works with which I am associated, as there are subjects of greater interest to the industry and to the Association. It is sufficient for me to say that we discharge our duties to consumers and owners to the best of our ability, and in the best possible manner.

For some years our "friend in disguise," the electric light, has been haunting the minds of many; and the present position demands consideration. The Government are apparently intent on developing the use of electricity by any and every means in their power; and from all I can hear, they will have absolutely to "pirate" all the lighting load of both gas and existing electricity companies, not so much to make their scheme pay as to reduce their losses. My opinion, for what it is worth, is that the scheme, for many years, will prove a burden on the Free State, instead of the great boon people have been led to expect.

Last year I was very keen on getting gas companies to obtain statutory powers and Electricity Orders, and set up an A.C. plant to supply electric current; and then, when the Shannon supply of electricity became available, they would be in a position to distribute this supply. The authorities were at that time all in favour of our building up a business in this manner, ready for an outlet for their current. Some months ago, however, I found that any company sinking capital for new plant would not be allowed to recover that capital charge on the Shannon electricity. For some time I have been trying to ascertain the conditions under which electric powers will be granted, but so far without result. I am afraid, when they are issued, they will be found detrimental to all small companies, either gas or electricity.

Do not think from what I have said that I am looking on gas undertakings as doomed to extinction. It is quite safe to assume that, even as gas did not displace the paraffin lamp, so will electricity not displace gas. Yet we must be prepared to lose the lighting of many of our best customers, who, in spite of the cost of installation and current, will have electricity. The field open for the supply of gas for cooking, heating, &c., is still great, and must be developed, so that by the time we have electricity available in most towns, we shall have a steady demand for gas during the day, instead of a peak load during the hours from sunset to midnight. Many of us have been engaged in active competition with electricity for lighting purposes, and still are able to report progress and increased sales year by year. Those who have not so far met with competition must adopt the methods successfully employed by others. Easy employment will never help us to develop our best faculties; competition brings out our highest powers.

It will be in the interest of companies, public authorities, and consumers in the gas industry to cater for the supply of electricity—particularly in the small towns, which the majority of our members represent—providing the Government will grant such powers that a small company can undertake the distribution of Shannon electricity. The advantages of this combination were pointed out in 1919, 1924, and 1925 by our members. The electricity branch can be run by the same management; consumers reaping the benefit of reduced overhead charges—and, of greater importance, not being persuaded by prejudiced canvassers into installing electric appliances where gas would give an equal or better service, and be much more economical.

No effort should be spared to increase our output for cooking, heating, and industrial purposes. By these means we should be able to recover some of the sales lost by our lighting department. If the sale for heating purposes is not increased, many of the small undertakings will suffer considerably. That the reduction in output affects the unaccounted-for gas, and increases the cost of manufacture and distribution, is a well-known fact; but do we consider the importance of it? We must reduce our manufacturing costs to a minimum consistent with the quality of gas suitable in every respect for the purpose required, and which will ensure satisfaction to the consumer. It is impossible to create and maintain confidence between consumers and suppliers—so necessary for successful buiness—if apparatus is not maintained at a high standard of efficiency. No opportunity should be lost of rectifying faults and advising consumers of possible improvements.

All Non-Statutory Companies Advised to Apply for Powers.

In conclusion, I would draw the attention of the members to a letter sent out by your Committee to the chairman and directors of every non-statutory gas company in the Free State, shortly after our meeting in August, 1924. To this there was a very poor response.

DEAR SIRS,—At the annual general meeting of the above Association, held in Dublin on Aug. 13, 1924, a deputation was appointed to call on the Ministry of Industry and Commerce, Dublin, to further the interests of all gas companies in regard to electrical competition. The Committee appointed (Messrs. J. D. Smith, M.Inst.C.E., J.P., Belfast, President; J. O. Halliwell, Mullingar, Vice-President; T. J. Reid, Ballina; G. W. Norman, Dublin; and G. Airth, Dundalk) had an interview with Mr. Fred J. Allan, of the Power Section of that Ministry, on Sept. 24.

Mr. Allan made it abundantly clear that, until gas concerns became authorized, or statutory, companies, any application by them, or objections to electrical supply powers, could only be considered on the same basis as applications or objections from private individuals. If, however, a gas company had obtained statutory powers, as such, and the supply of gas had been satisfactorily maintained in its area, preference would be given in the consideration of an application for authority to supply electricity, having regard to the existence of organization and also having regard to the fact that the Ministry is not desirous of encouraging such competition as would unreasonably affect capital which has been invested in local gas undertakings.

Mr. Allan expressed the opinion that if any fairly large proportion of non-statutory gas companies were to join in an application for a Joint Special Order under section 10 of the Gas Regulation Act, 1920, the expense in which each company would be involved should not exceed £10. As the powers of the Electricity Commissioners are now vested in the Minister for Industry and Commerce, the subsequent application for an Electricity Special Order under the Electricity Supply Act, 1919, would not involve the applicant in heavy expense. Under an Electricity Special Order, the party on whom the Order is conferred is allowed two years within which the supply of electricity should be provided, or such extended time as the Minister for Industry and Commerce might approve; and in connection with the fixing of such period, due consideration would be given to the possibility of obtaining, in the near future, a supply in bulk from a national supply station, such as that contemplated under the proposed Shannon scheme.

The Committee suggest that all non-statutory companies should consider the advisability of applying immediately for statutory powers as gas companies, and also of subsequently making application for authority to supply electricity.

This Committee cannot too strongly urge upon every non-statutory gas concern that they are now afforded what is probably *the last chance* of securing their rights and privileges at a low cost.

GEORGE AIRTH,
Hon. Secretary.

Those non-statutory companies who have not applied are losing an opportunity which will never come their way again. Even if they did not secure the rights to supply electricity, they would have rights which they never had before as statutory gas companies.

VALUATION OF GAS-WORKS FOR RATING.

By J. H. ALLEN, Surveyor and Valuer, Dublin.

[A Paper read before the Irish Association of Gas Managers.]

The practice in regard to the valuation of gas undertakings has become a very technical process, and it is therefore difficult in the time at my disposal to deal with the operations with any measure of completeness. In what I have to say, therefore, I eschew controversial points, and keep to the main outline of the principles adopted.

Before coming to consider the subject under review in the aspect of most interest to those engaged in the industry, it is necessary to have in mind the statutory authority within the bounds of which the operations of valuation must be kept. The preamble to the Valuation (Ireland) Act, 1852, cites the necessity for "one uniform valuation of lands and tenements in Ireland which may be used for all public and local assessments and other ratings."

Section 11 of the Act lays down the definition of rateable value: "And such valuations in regard to houses and buildings shall be made upon an estimate of the net annual value thereof —that is to say, the rent for which, one year with another, the same might in its actual state be reasonably expected to let from year to year—the probable average annual cost of repairs, insurance and other expenses, if any, necessary to maintain the hereditament in its actual state, and all rates, taxes and public charges, if any, being paid by the tenant."

There is no reference in the Act of 1852 to gas-works; but that they are to be considered "buildings" within section 11 is borne out by section 4 of the Act of 1854. This Act was framed to provide for the annual revision of rateable property; and section 4 expressly includes gas-works as rateable tenements or hereditaments.

It is submitted that, with the above definition of rateable value clearly in mind, we should be in a position to extend our inquiry to the broader phases of the subject of this paper. In making a valuation of a gas-works, or, indeed, of any other rateable hereditament, what has to be arrived at is the rent for which the property would let one year with another; the tenant doing repairs and paying rates.

The first point that arises is that a gas-works is never let on the conditions laid down in section 11. But we must assume such a letting not only to be possible, but actually being contemplated—which assumption conjures up the "hypothetical tenant" who is assumed to conform to the statutory conditions.

THE HYPOTHETICAL TENANT.

The problem, then, is what rent the hypothetical tenant would pay for the gas-works; and the solution is arrived at by the application of what is known as the "revenue" or "profits" principle, a formula which has withstood attack from all sides, and still receives the approval of the courts, or, at all events, is held not to be wrong. And I might here mention that in connection with the new valuation legislation in England, eminent counsel specializing in rating cases have advised that no other method of valuation would be likely to satisfy the courts.

Adopting the accepted method, therefore, we assume a gas-works in working order, and a hypothetical tenant considering what rent he would give for its occupation and use. He would, in the first place, look to the accounts to see what profit is being made. He would say the receipts are so much; it costs so much in the shape of coal, labour, and so forth, to earn these receipts; and the rent which he could afford to pay must come out of the difference between the gross receipts and the working expenses —or, in other words, out of the net receipts.

RENT.

Before seeing what rent he can pay out of the net receipts, the hypothetical tenant, who must be assumed to be a reasonably businesslike and prudent person, will look for a return in the shape of trade profits on the capital which he must find to carry-on the business. He has to find money to equip the undertaking with meters, stoves, and cookers, to meet the ever-recurring incidental expenses, to provide a stock of coal over and above the actual consumption of the retorts, and so forth. That is to say, before he can find what remains of the net receipts, in the shape of rent, he must have his profit on the trading; and deducting this, the balance will represent "rent."

It will be seen that there is nothing extraordinary in the "profits basis" of valuation. It is just the old principle which governs the annual rental value of land. The tenant does the operations to make the land produce a fair yield, he gets a reasonable margin of profit on the sale of the produce, after defraying the necessary expenses of so doing; the margin over and above representing the rent he can hand over to his landlord. This, then, is broadly the revenue principle as applied not only to gas-works but to railways, tramways, electric light works, and all similar monopoly or quasi monopoly undertakings.

The more particular application of the valuation now falls for consideration; and before coming to details it may be well to refer, very briefly, to the changed circumstances in the industry. One of the main objects of the Gas Regulation Act, 1920, was to restore the undertaking to its pre-war earning capacity. This is significant, and up to the present gas-works shares have not been re-classed as "trustee securities."

It will be seen that capital in one form or another looms largely in valuation practice. In the earlier circumstances, a certain amount of original capital was sunk in the undertaking by the landlord to provide the gas-works, and new capital was seldom required. The conditions now are that a large amount of capital has to be provided (by the hypothetical tenant) for prepayment meters and installations, cookers, stoves, and so forth; and it is contended that it is this capital which to a great extent enables the undertaking to pay its dividends. This, for valuation purposes, is a most important consideration.

At present, an undertaking dependent on coal as a raw material comes within a special category as regards earning powers. I need not develop this.

REVENUE PRINCIPLE.

Returning now to the revenue principle and its application, the first step is to examine the accounts; and the point immediately arises as to what year or years are to be taken as the data for the valuation. Section 11, it will be remembered, says the "rent for which one year with another," and it would appear from this that an average of years would be the best criterion—that is to say, the hypothetical tenant would be guided by what profit was made in the past to arrive at what profit he would be likely to make in the future. Providing that no extraordinary conditions prevail, it would appear that an average would be the most equitable basis on which a rent could be arrived at. For many years it was the invariable practice in Ireland to adopt an average, but the tendency at present is to work on the last available year's accounts up to the making of the valuation; and I must say that, while I cannot agree with the later practice, I appreciate the difficulty in working on an average of years in the cases of some undertakings at present. But it cannot be disputed that the hypothetical tenant would look at the trend of the figures.

The first step, then, is to take the receipts from the sale of gas from ordinary and prepayment consumers, from rental of meters and stoves, from public lighting, and from residual products.

Bearing again in mind that we are fixing a rent for the gas-works, we cannot take into account receipts other than those arising from the sale of gas, including, of course, residuals. The sale of fittings, for instance, should not be included, if their cost and handling can be eliminated from the accounts. Dividends on investments would certainly not affect the hypothetical tenant.

From the receipts have to be deducted the working expenses; and in regard to these, again, it must be remembered that only those items for which such a tenant would be liable should be used as deductions. It will be evident that charges cannot be made in respect of rent as such, as it is the amount of rent we are seeking. For the same reason head rents payable are clearly not deductions.

INCOME-TAX.

As regards income-tax, I hold the matter is not free from doubt. In every business, Schedule A is deducted. However, the matter has never been argued in Ireland. Then as regards rates and taxes, the amount under this head cannot be computed until the end of the inquiry. Similarly other items must be considered in the light of the hypothetical tenancy.

In connection with the items for repairs and maintenance of works, plant, and mains, several difficult points arise. Section 11, as we know, indicates an average amount, and items under this head give rise to considerable difference of opinion.

Having dealt with the accounts, to delete the items which do not come into our calculations, we arrive at the difference between the gross receipts and the working expenses, or the net receipts, the fund out of which the tenant is to pay his rent and rates and take his share of the profits.

TENANT'S CAPITAL.

This brings us to the difficult item of "tenant's capital." Again, keeping before us the hypothetical tenancy, the tenant taking over the gas-works must have in hand a sufficient amount of cash to carry on the working until he can collect his accounts. The amount to be allowed will depend upon when he makes his collection. If this be quarterly, the receipts will not come to hand for some period beyond three months, as time must be allowed for the reading of meters, sending out accounts, and for collection. Since slot meters have formed so large a means of ready collection, a set-off in respect of this seems equitable. The inflow of revenue from residuals should also be considered. The extent of the allowance for "floating cash" must therefore be arrived at in each particular case. Further, money to provide a stock of coal (and oil) over and above the actual demands of the retorts must be available. The amount will depend on the source of supply, proximity to markets, and possibility of coal strikes. All these allowances are in the shape

of cash, and it is reasonable that a set-off should be also made for consumers' deposits, if any.

The next item would cover meters, stoves, cookers, and installations which the tenant would provide. It is argued that the tenant would take all these over with the property from the last occupiers; and it has become the practice to include all these fittings at present value rather than at cost. This is a very debatable subject, if the conditions are kept clearly in mind. However, there is little doubt that, as regards meters at all events, upon which the tenant relies for the checking of his customers' accounts, a very small deduction, if any, can be admitted to reduce actual cost to present value. The next items in the tenant's capital are the present values of furniture in offices, tools, and implements, horses, carts, and all the miscellaneous effects in use and in stock, including, of course, residual products not sold. The above form the usual ingredients in the tenant's capital.

Again, the special circumstances of each case have to be considered, and some most important questions arise on what the tenant's capital can include. It will be seen at once that the change in the industry in the increased demand for prepayment fittings should considerably benefit the tenant, by increasing the amount of his capital; and the importance of giving effect to the altered circumstances seems evident.

Having arrived at the amount of the tenant's capital, and once more reiterating that the tenant looks to this figure to pay him for working the whole concern, the point arises as to what percentage he will look for. For many years before the war the rating authorities allowed 17½ p.ct., this being made up of 5 p.ct. interest, 10 p.ct. trade profits, and 2½ p.ct. for risks and contingencies; but following a decision in an English railway case, the amount allowed was reduced in Ireland to 15½ p.ct. This is a matter which has never been fully argued in Ireland, though the courts have restricted the allowance to 15½ p.ct. in those cases which called for remark. In a recent hearing it was suggested that the amount to be allowed could not be disassociated from that of the company's statutory dividend.

We have arrived at the net receipts, provided for repairs and maintenance, and estimated the tenant's share and the proper allowance thereon.

Sinking Fund.

We are now entitled to a sinking fund to provide for the replacement of the hereditament at the end of its life—this in addition to ordinary repairs and maintenance. Take any portion of a gas-works, to no matter what extent it may be repaired the time will come when it will be no longer efficient, from either general decay or obsolescence. The hypothetical tenant, being a prudent person, will provide for this, or is assumed to set aside an annual fund to replace the various items when they no longer function to their required capacity.

The various deductions dealt with being taken from the receipts, leaves an amount which represents what the tenant can afford to pay as rent and rates; and knowing the actual poundage, the matter of dividing this figure between rent and rates is one of simple proportion.

Need for New Valuation Practice.

As already pointed out, it is difficult, in a short paper, to do more than indicate the process of valuation for rating purposes; and though that process is common to railways and tramways and similar undertakings, its application to gas-works needs particular attention. There is an over-strong tendency in Ireland to follow English rating practice. It needs little thought to see that, in the main, the Irish gas industry has not the same field of operations as obtains in England, and as regards the Valuation Statutes there are fundamental differences which should be largely in favour of Ireland.

Again, in the use of the formula, the conditions of the hypothetical tenant as distinct from the working of the concern by a company fettered by legislation need to be kept clearly in mind. Take as an instance the charges for repairs and maintenance. It is argued that having allowed a renewals fund the actual amounts charged in the accounts should be restricted to mere repairs only. Again, I have seen it pressed that the charges in the accounts under this head should be ignored altogether, and some more or less empirical amount substituted.

Further, it has been contended that the hypothetical tenant is strictly prohibited from putting in a yard of main to replace a broken piece—in other words, he is not allowed anything for stores which he would use to repair any portion of the rateable property.

After an experience of some fifteen years of valuation work covering railways, tramways, light works, and practically every class of property, I have come to the conclusion that in Ireland we rely too far and to too great an extent on English practice, that the time has come to give effect to the distinctions between Ireland and England, and that it will be in the best interests of the gas industry to help to mould Irish valuation practice into a form more fitting to the conditions of the country.

THE EVOLUTION OF GAS PLANT.

By S. B. Langlands, of Glasgow.

[A Paper read before the Irish Association of Gas Managers.]

To attempt to write a comprehensive paper on this subject would defeat my object in taking the title. I want to show that, in the past, improvements on gas plant have come naturally and effectively from within the industry—that those in charge of gas-works, in days gone by, met their hills of difficulty, and scaled them without outside help. To-day we are, I am afraid, too disheartened by the constant distraction of irritants like coal strikes, the compulsory meeting of a thirst for knowledge by Government departments, and their intermeddling with works management, the newspaper bogeys of falling francs, or our international indebtedness, to give full play to our individuality. We are trying to work out our lives in battalions; yet, at the end, like Kipling's Tomlinson, we shall find that individually we must render an account of our stewardship.

Gas manufacture, more than almost any other industry, is, to my mind, a perfect illustration of engineering evolution—of steady, thoughtful development, brought about by those in charge of, or at least directly interested in, the various gas-works throughout the country.

Let us think particularly of this evolution. Take carbonizing plant. One of the earliest drawings shows Accum's retort—a mere wash-house boiler, a vertical retort lacking the one essential feature of coke discharge from the base. If this feature had been embodied, the whole gamut of diverse horizontals and "slopers" might never have been tried. The trend was, however, from upright vessels to more easily discharged horizontals. Then, from cast-iron rounds, ovals, and ⌂'s, we came to brick and moulded fireclay of much the same sections. Discussions of that time ranged over the advantages of rounds, ovals, and ⌂'s, sometimes tried with "eruptions" in the centre of the retort throughout its length, or with flutings, but all tried first before regenerative firing arrived. The making of water gas was mooted, and is carefully described in the earliest edition of "Hughes on Gas Manufacture." So we advance and recede; to-day's novelties are sometimes "throw-backs." Still, we have gradual *economic* progression. I stress the word economic. The strength of the gas position to-day is accounted for by the fact that it has always enjoyed competition. This competition compelled rigid carefulness. As youngsters in the industry we were given the aphorism that "profits are made in the retort house;" and this and other aphorisms expound the story of a continual struggle to make good, and to hold the position against all rivals. This point is self-evident, and need not be laboured. Candles and cheap oil gave good competitive lighting in those days. The advent of regenerative firing brought great economical strength to the industry. Inclined retorts had their day, just as charging machinery had its day. To-day, verticals and coke-oven practice prevail.

Throughout the century, the raw material used has gradually changed—cannel coal and 30-candle gas; then high-class gas coals enriched by shale or oil processes, yielding a 20-25 candle gas; then a 16-20 candle gas obtained from chosen splints, with good coking qualities; to-day it is almost "take what you can get" in the way of coal, and give, if you can, 475 B.Th.U. gas. Each class of raw material used brought its own problems; and each problem was met quietly and resourcefully by our forebears in the industry. In carbonizing engineering there were also the many—very many—small aids coming to add to the perfecting of the process; the development of bench fittings ranging from cast-iron hydraulic mains of scanty round sections to the wrought-iron ⌂ sections of ample area. We have the study compelled by pitching of ascension pipes, &c., of areas and proximity to the bench; and we have discussions on dry or wet mains.

So I would ask you to give a thought to some of the big men who have gone before, and to their steady plodding up the hill, and, in appreciating their splendid work, to feel that in individual effort must lie the perfection of any business. What a wealth of thought these forerunners of ours gave along every line. The same engineer who gave a carbonizing solution gave an effective meter. Others dealt scientifically with coal values, or strains and stresses in holders; and for the most part all this research and invention was done in works comparable in size with the ones you manage.

I would like, some day, when sufficient leisure comes my way, to go fully and in detail into this subject of the evolution of gas plant, giving credit to the long list of workers—true engineers, when we think that the word "engineer" comes from a word meaning an ingenious person. To-day I want

you, as individuals, to think of your problems of the future, not leaving them for solution merely to academic persons, research students of the Universities, or Government appointed searchers. At our Institution and Association meetings we are getting fewer and fewer individual efforts from among ourselves, and more and more lectures by eminent persons, or lengthy reports compiled not always by those immediately at work on the subject reviewed. Take one or two instances:

Refractories.—The tests should be made in small works, where conditions prevail, and are not created to permit of experiment. You in your everyday work give these materials the severest of working tests because of the necessary intermittency of gas work.

Coal Testing.—In small works so much depends practically—and economically—on the getting of the last 100 c.ft. or the last lb. of coke, that your existence depends on your working knowledge of your raw material; and the transition from working knowledge to accurate quantitative analysis is not beyond encompassing. The search just now is keen for a good solid smokeless fuel; surely you in small works in Ireland know something of such a subject, for your existence as a going concern depends on your supplying, in addition to your major product, gas, a first-class coke which can be used easily by all.

You have yet another problem in the possibility and advisability of grouping works in districts. Gas-works accountancy needs recasting in the small works to make a dividend. Care of the pence is essential, and care of the pence is the first principle of accountancy. But why go on? My case is made.

In bygone days our worthy sires were true individualists. Each met and faced his day's difficulties, and later met his professional brethren, when all rehearsed and faced again their day's tasks, and told and heard of solutions and satisfactions.

The war left many a gas-works a vile heritage, after having met the country's needs and given required products. Managers stepped from the strait gate of gas manufacture, with the result that the aftermath was diseased plant, choked mains, services, and manufacturing plant, and bitten and almost destroyed meters. Yet the industry's physicians brought remedies, and you are stepping back gradually into evolution's easy way, leaving revolution's destructions behind you.

You have a paper to-day on gas purification; we might have also considered this from an evolutionary point of view, and been interested to find that in the new Koppers plant we again have a suggested throwback to the "milk o' lime" method.

Now for my *envoi*. I have felt privileged in being asked to come among you again, and I am afraid I have gloried in that privilege to the extent of asking you to talk "shop" easily and freely with an erstwhile colleague. As I said before, I could have been expansive—and may yet be in book form, by drawings and designs and discussion of detail in a century's gas plant. I preferred rather, to-day, to be provocatively suggestive, and so loose your tongues to tell of your own experiences, and freely give your own ideas on gas-works evolution, and its possible future trend. Might I ask one thing? If you are doing away with obsolete plant of old-world design, photograph it as a record for future gas historians. In Ireland, more than anywhere, one comes across original designs and daring engineering trials. It was there I saw a single-column gasholder.

In Ireland the Claus process was radically tested by a daring engineer—one so full of courage that he came before his professional brethren, and told of his defeat and its cost. The same engineer surmounted difficulties, in what were breath-taking ways, making annular junctions of huge pipes when he could neither get above nor below, going into the air with his purifying plant when he could not get a sufficient area of ground.

Truly the history of the evolution of gas plant is worth our consideration. It is exhilarating to ponder upon the gradual emergence from a tiny process carried out on an almost laboratory scale at the beginning of last century to the industry's present essentiality.

MEETING OF THE BRITISH ASSOCIATION.

Further Contributions.

COAL AND CO-PARTNERSHIP.

Before Section F (Economics) on Tuesday, Aug. 10, Dr. JAMES A. BOWIE (Department of Industrial Administration, College of Technology, Manchester) dealt with the subject of coal and co-partnership.

Dr. Bowie said it was not true that the principle of profit-sharing had been tried since 1921 in the coal industry, and had proved a failure. What was tried was not profit-sharing, and it had not proved a failure. The coal industry schemes of 1921 and 1924 were not profit-sharing, because they were district schemes, and the profits or losses of the particular colliery in which a man worked had no reference to the percentage declared on basis rates. Again, the money paid under the coal schemes did not constitute an addition to wages, but the schemes were themselves means of determining wages. It was probably this confusion that accounted for the exaggerated hopes entertained for the 1921 scheme.

Mr. Lloyd George (then Prime Minister), in announcing the scheme to the House of Commons on June 28, 1921, claimed that it would mean "peace for a very long period . . . a condition of harmony that never prevailed before in the coal industry . . . a new era of co-operation in the industry," and that it would introduce "a new spirit which would have the effect of increasing the output" by giving the workmen "a direct individual incentive to effort." The lecturer had pointed out at the time that the mellifluous promises of the politicians were totally unwarranted; and events had proved this to be only too correct. Statistics showed that the correlation of proceeds and wages had done nothing to sweeten industrial relations. It had not reduced absenteeism, and had not led to increased output. The agreement did not, and never could, supply "a direct individual incentive to effort." "If," said Dr. Bowie, "there are 50,000 men employed in a district, at (say) 200 different collieries, is it likely that John Smith will work harder because, if all the others at the same pit work harder, and if all the employees at the other 199 pits work harder, and if trade is good, and the management efficient, and if he is not dismissed, he will get a 1-50,000th share of 83 p.ct., of any surplus proceeds, if there be any surplus proceeds to divide?"

The real merit of the 1921 agreement lay in its effects on employment. The lecturer showed by statistics relating to the country as a whole and to the separate districts that the proceeds-sharing provisions, when in operation, had promoted both the extent and the regularity of employment. The 1921 scheme was first evolved in outline in 1916 by a Committee of the Mining Association. It was a scheme unique in the industrial history of the world; and its conception and execution indicated that colliery owners were not so devoid of initiative and enterprise as it was to-day common to suppose. The scheme was a landmark in the history of wage regulation. It embodied the desirable principles of measurement and publicity, and in its intention it marked the adoption of the most scientific method yet employed. It meant the removing of wage negotiations from the misty region of *ex parte* assertion and counter-assertion into the clear light of ascertained fact. It was certain to be the method of wage regulation of the future; and already such industries as pottery, iron and steel wire, engineering, and shipbuilding seemed to be moving in its direction. But the problems of output and industrial unrest would not be solved by any method of wage regulation, however scientific, because they were problems of status more than wages.

Dr. Bowie thought that the most hopeful line of progress open to the individual employer lay in the direction of co-partnership. The cardinal need in the industry to-day was a new spirit. Even the re-organization of the industry, desirable though it might be, would in the present sensitiveness of enmity only result in fresh contracts from which the sparks of friction would fly. At no time since the industry was de-controlled had it been other than a wealth-wasting cockpit of strife. Two protracted national stoppages had taken place, two Royal Commissions had, since the war, investigated its problems, two Courts of Inquiry had considered its disputes, and two enormous subsidies had been poured on the troubled waters—and all apparently to no purpose. The inescapable truth was that, behind the facts, stubborn as they were—though not more stubborn than in other industries—lay the unfriendly attitude of two parties, whose whole mental and emotional make-up grated on one another, so that agreement in any case was difficult, and in difficult circumstances impossible.

If a new spirit was to be engendered, it would not begin among the accredited representatives of both sides. The new outlook could be developed only at the pit, where men met and worked, and lived together. This involved the cultivation of personal relations between managers and men, and free communication to the men of business details, the frank discussion of pit grievances, the development of educational schemes, and the spirit of democratic adjustment on the part of the owners. Ultimately men of flesh and blood were bound to respond. If the goodwill and enthusiasm of the workers could be enlisted, a radically new industrial situation would arise. The losses to the community and to the miners themselves due to the more overt neglect of production were immense. As far as calculations could be made, it could be safely stated that the miners, through disputes, had, since the formation of their Federation, lost in wages a sum which would have enabled them to buy-up lock, stock, and barrel the whole of the collieries of this country. In voluntary absenteeism they had lost a sum of equal amount. While the community, at a conservative estimate, had lost at least four times the present-day capital value of the collieries. Outside Bedlam, did ever such conditions exist?

The Coal Commission suggested, Dr. Bowie continued, that co-partnership be made compulsory. No precedent existed for this, though the coal industries of France and Czecho-Slovakia had schemes which bore some relation to it. Compulsory co-partnership would be no more successful than compulsory matrimony, and for much the same reasons. If, however, the majority of owners and men supported it, there would be no harm in bringing the recalcitrant minority into line. The argument against compulsory co-partnership had been best put by the people who advocated it. The Coal Commissioners, in reference to pit committees, said: "In our judgment, however, where it is a question of the participation of different bodies for a common purpose, it is far better, wherever possible, to leave the arrangement of their method to the voluntary action of the parties themselves. The result is more likely to suit the needs of the case, and to promote a friendly spirit in the working, than the compulsion of an Act of Parliament and the rigidity of Departmental regulations."

A SUGGESTED SCHEME.

Dr. Bowie proceeded to discuss the details of a scheme which he suggested would meet the needs of the coal industry. He proposed that three years' service should be a condition of participation, in view of the heavy labour turnover, reaching as high as 25 p.ct. in the industry. Absenteeism over four days was to be penalized by loss of bonus. To forestall the possibility of men leaving their unions, any employee who allowed his membership to lapse was to lose his bonus for that year. To avoid the difficulties of re-valuing assets, he suggested that the profits to be divided should be one-third of the excess over a sum equal to 10 p.ct. of the wages and salaries bill. All charges, except for amortization and reserves, were to be reckoned as costs of production. Employees of long service were to receive preference in allotment. The employees' bonuses were to be invested in ordinary shares until such time as they acquired one-third of the issued ordinary capital, when the shareholders, including the employee-shareholders, were to reconsider the scheme. The scheme was to be administered by a Co-Partnership Committee of nine, who would be entitled to appoint one of their members a Director of the company whenever the workers held one-tenth of the ordinary capital, and so on *pro rata*, on the understanding that the holders of the remaining ordinary shares had a similar right to the appointment of Directors.

HYDROGENATION IN ORGANIC ANALYSIS.

Before Section B (Chemistry) on Tuesday, Aug. 10, Prof. H. TER MEULEN, of Delft University, described work which he has done in the use of hydrogenation in organic analysis. Generally speaking, the substance to be analyzed is heated in a quartz tube through which a current of hydrogen is passed; and in most cases catalysts are used to promote hydrogenation. It was pointed out that sulphur is converted into hydrogen sulphide, which is estimated by titration with iodine solutions. If the amount of sulphur is very low, as in the case of coal gas and oil, a colorimetric method may be used. The nitrogen of organic compounds gives ammonia, which is estimated volumetrically. Oxygen is changed into water which is weighed after absorption in calcium chloride.

The percentage of nitrogen, as shown by hydrogenation, said Prof. Meulen, was more or less identical with the results obtained by Kjeldahl's method, but there was a difference in the nitrogen in samples of coke and coal. He believed the hydrogenation process was the more accurate.

By the estimation of the oxygen, it had been possible to make a complete analysis of the constituents in a sample of coal as follows:

	P.Ct.
Carbon	79·9
Hydrogen	5·1
Nitrogen	1·8
Oxygen	4·4
Sulphur	1·15
Ash	7·36
	99·71

The following figures were also given for two samples of coke analyzed by the hydrogenation process:

	Sample 1. P.Ct.		Sample 2. P.Ct.
Carbon	84·3	..	88·8
Hydrogen	0·33	..	0·24
Oxygen	0·85	..	0·70
Sulphur	0·95	..	0·69
Nitrogen	1·06	..	1·40
Ash	12·94	..	8·41
	100·43	..	100·24

Prof. Meulen claimed that these results, taken from a large number, proved the accuracy of the method, while the analyses could be carried out in a much shorter time than by the more usual destructive oxidation methods.

The lecturer demonstrated his method at the University Museum in the evening.

CLASSIFICATION OF PATENT SPECIFICATIONS.

In a contribution before Section E, Dr. A. T. THURSTON remarked that patent classification has to achieve somewhat conflicting objects—*i.e.*, (*a*) to enable a manufacturer or individual to ascertain whether he may manufacture or use an article or process with impunity; (*b*) to enable a manufacturer or individual, in the event of receiving a threat of an infringement, to ascertain what his chances are if he fights the action; (*c*) to enable an inquirer to ascertain the whole existing public knowledge of any art or manufacture; (*d*) to enable an inventor or his agent to claim as much as possible under his patent; (*e*) to enable the staff of H.M. Patent Office to protect the public by seeing that no more is claimed than is permissible—*i.e.*, that the claims are novel; (*f*) to enable a manufacturer or individual who finds that his competitors have obtained patents to demonstrate the invalidity of such hostile patents or to restrict their scope.

Patent classification should obey the basic laws of classification—*e.g.*, (*a*) it should proceed from wide headings to narrow headings, from terms of great extension and small intention to terms of small extension and great intention; (*b*) it should be adapted to admit interpolations; (*c*) the characteristics chosen for subdivision of any one class or sub-class must be consistent throughout that class or sub-class; (*d*) the headings must be mutually exclusive; (*e*) the terminology used must be consistent, the meaning of terms being invariable throughout.

The system adopted by the British Patent Office is a superb achievement. It has now been in daily operation for over twenty years, and has enabled searches to be made with precision and accuracy. In the existing British classification every specification is indexed thoroughly for all matter of interest, whether claimed or not, and appears in the indexes under all relevant sub-headings (this is not the U.S.A. or German practice). Each class or sub-class is specifically defined by the headings appearing under it and the references from it to other classes. There are no "see also" references. The published classification and allotment of cases under it are exactly those used by the examining staff. This is not so in the U.S.A. office or in German practice.

Coal Handling and Ash Removing.

Interesting features of the Harrison (New Jersey) Gas-Works, now in course of erection for the Public Service Electricity and Gas Company, are, according to the "Gas Age-Record," the coal handling and ash removing systems. Only four men are required to operate the two. In eight hours the coal-handling apparatus can move more than 1000 tons of coal or coke from barges and deliver to either the generator house or the boiler house. From the barges a clam shell bucket, of 3-ton capacity, and operated by one man, unloads the coal or coke into a hopper, from which a motor-driven belt conveyor carries it to a point where it is screened. After the screening, the large coal or coke continues on a conveyor belt to the generator house bunker, and the fine coal or coke moves on another conveyor belt to the boiler house bunker. At this juncture the human element again enters, for one man each is needed at the boiler house bunker and at the generator house to operate the motor-driven lorries. In the boiler house the lorries carry the fuel to the chain-grate stokers, and in the generator house to the generators. Removal of the ashes from the boiler house is accomplished by washing them along a sluiceway to the ash pit. The water used is on its way back to the river, after having cooled the gas in the condensers. From the generator house the ashes are removed by travelling lorries to the same pit. The pit is so designed that a "clam shell bucket," operated by a fourth man, can load the ashes on railroad cars.

Institution of Public Lighting Engineers.—Among newly-elected members of the Institution are Mr. J. W. Thirsk, Gas and Water Engineer and Manager to the Beverley Corporation; Mr. F. E. Ward, Engineer and General Manager of the St. Helens Gas-Works; and Mr. W. Wilson, Gas Engineer to the Burton-on-Trent Corporation.

Ceramic Society.—The seventeenth meeting of the Refractory Materials Section of the Ceramic Society will be held in Leeds on Sept. 9 and 10. Mr. Frank West, the Chairman of the Section, will preside. Among the papers to be read are "The Influence of Foreign Matter on the Thermal Expansion and Transformation of Silica," by Prof. J. W. Cobb, Dr. H. S. Houldsworth, and Mr. J. F. L. Wood; and "Refractories in the Gas Industry," by Mr. W. T. Gardner.

Association of Statutory Inspectors of Gas Meters.—In our report of the annual general meeting in Glasgow on Aug. 5 (see "JOURNAL" for Aug. 11, p. 327) it was stated that Mr. F. Coe, of Nottingham, "maintained that inspectors should follow the same system as the manufacturers, and test singly." Mr. Coe writes to inform us that what he said was: "What a lesson we are having on the peculiarities of gas meters when tested under different conditions. I have hitherto unsuccessfully advocated the need for testing meters under different conditions."

INSTITUTION OF CHEMICAL ENGINEERS.

Examination Papers for Associate Membership.

The first examination for Associate Membership of the Institution of Chemical Engineers has just been held. This consisted of a "home" paper, for which one month was given, and four written papers under ordinary conditions in London. Finally there was a viva-voce examination.

On reading the "home" paper, we were at once impressed by this short sentence: Little credit will be given for correct answers when the method of attack of the problem and the calculations are not given. As a matter of fact, this gives a clue to the nature of the questions set, and the demands made of the student. It is obvious that the examiners are out to assess the fundamental knowledge of the student, and are little concerned about the slick dexterity of the "examination expert."

Doubtless many will be interested to know what the questions in these papers were like, and we therefore propose to give a few examples, choosing those questions which will, it is thought, appeal most to our readers.

A typical example in the "home" paper is as follows:

The effluent from a drying plant contains ammonia (NH_3).

The volume of the effluent is 12,000 c.ft. per minute at a temperature of 30° C.; it consists of air containing 1·48 p.ct. of water and 1·1 p.ct. of ammonia by weight.

Report upon the commercial possibility of recovering the ammonia. Design the plant, making at least one good drawing of the general arrangement with sketches of details. Draw up a specification of the plant, and estimate its cost. Estimate cost of production of the product you decide to make, and indicate the profit which should be obtained by the installation of the system proposed.

Market prices of the day should be taken.

Here is another question from the "home" paper:

The gases generated during the high-temperature cracking of petroleum oils contain fairly large amounts of gaseous olefines, principally ethylene and propylene. At a certain plant this gas, after being scrubbed with oil for the recovery of condensible hydrocarbons, has the percentage composition: CH_4 55, C_2H_6 18, C_2H_4 4, C_3H_8 12, CO 1, H_2 7, H_2S 1, N_2 2; and is produced at the rate of 4 million c.ft. per day, measured at normal pressure and 15° C.

Investigate the possibilities of producing from this gas either:

(*a*) A power alcohol; or

(*b*) A mixture of ethylene and propylene chlorhydrins.

Prepare a detailed report on this proposal; provide lay-out drawings and sketches of the plant you propose; draw up a specification and estimate the cost of production.

The following questions taken from the ordinary written papers indicate their practical nature.

(*a*) Discuss the flow of a gas through a sharp-edged orifice. Explain how you would use an orifice to measure the quantity of gas passing through a pipe. Sketch a suitable arrangement and state its limitations.

(*b*) How would you determine the maximum temperature obtainable from a given fuel? A coal has the following composition, by weight:

Moisture	3·05
Carbon	86·49
Hydrogen	2·36
Nitrogen	0·63
Sulphur	0·18
Oxygen	2·76
Ash	4·53
	100·00

Estimate the temperature of the products of combustion when burnt with twice as much air as is necessary for complete combustion.

(*c*) Discuss the laws governing the flow of fluids.

State the "criterion" of "stream-line" and "turbulent" flow, and indicate the value of this criterion in chemical engineering operations.

(*d*) "The conversion of coal directly or indirectly into liquid fuel products is of the utmost importance from the standpoint of the efficient utilization of the coal resources of the country."

Discuss this statement, and review the present position with regard to this subject.

(*e*) Discuss briefly the principles of steam distillation. Under what industrial conditions may it be used advantageously?

In the steam distillation of aniline, two liquid layers are formed, the composition of which is given by Alexejew as:

Temperature °C.	P.Ct. Aniline in	
	Aniline Layer.	Water Layer.
20	95·0	3·1
40	94·7	3·3
60	94·2	3·8
80	93·5	5·5
100	91·6	7·2
120	88·1	9·1
140	83·1	13·5
160	71·2	24·9
167	48·6 (critical solution temp.)	

Plot a graph showing the influence of pressure upon the composition of the distillate, assuming that two layers are always present, that equilibrium is attained in the vapour phase, and that the partial vapour pressures of the preponderating constituents of the solutions follow Raoult's law. Is any economy of steam to be anticipated from working the still under reduced pressure? What form would the "pressure—composition of distillate" graph take if the liquids were completely immiscible?

Vapour pressure data for the pure components:

Temperature °C.	Vapour Pressure mm. Hg.	
	Aniline.	Water.
60	4·5	149·2
80	17	355
100	46	760
120	104	1489
140	203	2709

(*f*) What methods are available industrially for the recovery of solvent vapours from air or other gases?

Tabulate briefly what conditions should be secured in the design of a scrubbing tower for the absorption of a soluble gas by a liquid.

What do you understand by the absorption coefficient of a scrubbing tower, and how is it influenced by operating conditions?

A cylindrical plate-packed scrubbing tower with a packed space 4 ft. diameter by 16 ft. high has been in use for the recovery of benzene from a gas containing 1·5 p.ct. of benzene by volume.

The volume of gas treated was 35,000 c.ft. per hour. The benzene was absorbed by a petroleum oil whose mean molecular weight was 350, which entered with a benzene content of 0·2 p.ct. (by weight) and was discharged with a content of 3 p.ct. Under these conditions only 80 p.ct. of the benzene in the gas was recovered.

You are required to erect a similar tower to extract 95 p.ct. of the benzene from twice the volume of gas, which contains 2 p.ct. by volume of benzene.

Prepare a proportioned sketch of the plant you suggest, and show the calculations involved. How much oil must be circulated per hour?

The operating temperature is 20° C., and heats of solution may be neglected. Indicate and justify any assumptions you make.

(*g*) Discuss recent developments in the practice of electrostatic or magnetic separation, illustrating your answer by detailed reference to one particular industry or problem.

(*h*) Discuss the physical and chemical principles involved in the manufacture of either:

(1) Synthetic ammonia; or

(2) Contact sulphuric acid.

How are these principles applied in industrial practice?

Illustrate your answer by a diagrammatic material flow-sheet of the plant.

What is the influence of (*a*) temperature,

(*b*) pressure,

on the course of the fundamental reaction involved?

(*i*) Discuss the behaviour of common constructional metals at high temperatures, mentioning any special materials of which you have knowledge, and their application in chemical plant construction.

(*j*) Indicate briefly the operations which are employed in the construction of vessels from the commoner sheet metals, describing the different methods employed in joining metal sheets, and giving examples of any special precautions which have to be exercised in the construction of vessels for typical purposes.

(*k*) Indicate the essential properties upon which the choice of refractory materials depends. Give classified examples of refractories, indicating their special properties, and briefly the reasons for these. Mention any precautions which have to be observed in the laying and use of refractory bricks.

(*l*) Give an account of the different materials employed in the construction of acid-resisting brickwork and stonework.

(*m*) Write a short essay on acid-resisting cements and jointing materials.

(*n*) Describe the conduct of a boiler test using coal. Please state what you would consider a good efficiency for any particular type of boiler and fuel. Give the necessary headings for a heat balance-sheet, and, assuming 14,000 B.Th.U. per lb. of coal, state what you would consider would be used in—

(A) Direct evaporation.

(B) Heat carried away by products of combustion.

(C) Radiation and imperfect combustion.

What in your opinion should the percentage of CO_2 be in the flues?

(*o*) State what is necessary in the equipment of superheated steam lines, stating materials. Give examples by sketch of standard forms of expansion joints and bends.

(*p*) Describe any plant you are acquainted with for boosting pressure in gas mains. Give sketches, and explain the principles underlying its construction.

"Income-Tax Up-to-Date."—A new and revised edition of this useful booklet, written by H. J. Gully, F.C.A., has just been published by the "Financial News," at 9d. net. The information is put forward in an extremely clear manner.

GERMAN GAS ASSOCIATION.

General Meeting at Danzig.

The Sixty-Seventh Annual General Meeting was held on June 10, 11, and 12, at Danzig, under the Presidency of Herr R. Jokisch, of Göppingen. From reports appearing in recent numbers of "Das Gas- und Wasserfach," we are able to give an account of the proceedings, from which may be gathered an idea of the present state of the industry in Germany.

Organization of the Industry.

In the opening of their Report, the Committee reminded members that this year's meeting was taking place one hundred years after the foundation of the first gas-works in Germany, and since the first public lighting by gas. On this occasion, it was urged, the central theme of the meeting should be the position of the industry in relation to the general industry of the country in the past, present, and future. There followed a short review of the various organizations and associations which have, by degrees, sprung from the parent Association. This was founded in 1859, and, since 1884, there have come into existence eleven district associations, all of which are directly affiliated with the main body, and some of which include electrical engineers in their membership. The object of this part of the organization is the exchange of ideas and experiences for the betterment of gas supply in both technical and administrative respects. The other aim of the Association on its formation was to organize research work, and, from small beginnings under the late Hans Bunte, this branch of the work has developed into the experimental and research station at Karlsruhe, under Dr. Karl Bunte, while Faculties are now to be supported by the funds of the Association at the technical universities of Berlin, Darmstadt, and Brunswick. The third branch of work which is under the direct control of the Association is the German gas journal, "Das Gas- und Wasserfach."

As the industry developed, it was found that purely technical matters were sufficient to occupy the full time of the Association. In 1904, therefore, it was decided to establish a commercial branch, and this was effected by the formation of a limited company under the title of the "Wirtschaftliche Vereinigung Deutscher Gaswerke" (Commercial Union of German Gas-Works). By this means, coke is sold and exported to the best advantage, tar is disposed of to distilleries and in other ways, certain bye-products are handled in bulk, and the interests of the industry in the fertilizer market are safeguarded. There is also a branch for the purchase of stores, and a subsidiary company undertakes gas-works insurance business.

In the year 1910 there was also founded, under the auspices of the Association, an organization called the "Zentrale für Gasverwertung," the objects of which, subscribed for by gas-works and plant makers alike, correspond very closely to those of the "B.C.G.A." To repair the ravages of the post-war coal shortage and the inflation period, an intensive campaign of propaganda was instituted at the end of 1923, and for this purpose the Z.f.G. and the Wirtschaftliche Vereinigung combined to form a limited company under the title of Gasverbrauch G.m.b.H. (Gas Consumption Ltd.). The organization has given results which are considered eminently satisfactory.

Points from the Report.

Last year's meeting in Cologne was devoted principally to the improvement of gas-works products. Many suggestions have since been made for the grading of coke, not only according to size, but also for freedom from moisture and ash. But the great difficulty in this respect is the continued refusal of the big coal syndicate to give guarantees of quality. Worse even than this, the syndicate have recently been attempting to classify the coals from various pits, which they consider of equal value, into price groups, without regard to the gas-making qualities, and have claimed the option to deliver any one coal of a group instead of the particular brand stipulated by the gas-works. Far from improving the reliability of coal quality, this arrangement would, in the Committee's opinion, be a retrograde step, and must be sternly resisted.

Relations between gas-works and the organized societies of plumbing and gasfitting firms are a problem in Germany. Between the desire to obtain their support in pushing the interests of gas supply, and the need to retain a free hand for the gas-works to do their own fitting and supply the apparatus which they consider best, there is room for much hard thinking.

There is considerable satisfaction in the gas-supply statistics, which show an increased consumption in 1925 of 10·3 p.ct. over 1924.

Experimental and Research Work.

The Gas Institute, which is the experimental and research section of the Association, working under Dr. Karl Bunte at Karlsruhe, is urgently in need of additional accommodation, for which a fund has been started. The work of systematically analyzing German gas coals from all available pits has been continued, thanks to bulk samples provided by various gas-works. The published results are found very valuable when coal contracts have to be made. Among the subjects of original research completed or in progress may be mentioned: The causes of the thickening of benzole wash-oil; the reactivity of coked fuels with O_2, CO_2, and steam; friction in the mixing tube of a bunsen burner; the carbon monoxide question, together with the optical measurement of degree of dilution of gas-cooker waste gases; the determination of the explosion limits and ignition velocity of modern town gas; testing the possibilities of azethylene for the perfuming of water gas; &c.

Another branch of the Institute is devoted to making expert tests on members' own works; and seventeen such commissions were carried out during the year, including tests on carbonizing plant, holders, and producers. The Institute serves also as a central laboratory for the whole industry, and samples of all kinds are tested at reasonable cost—an arrangement of especial advantage to medium and small works which do not possess the staff or facilities for carrying them out on the spot. Complete gas analyses, coal and coke tests, tar, purifying material, regulation of pyrometers, and many other subjects were dealt with during the year. One point is specially mentioned as likely to be of general interest, concerning blue discoloration of sulphate of ammonia. An inquirer who was always troubled in this way was advised either to incline the connection leading to the saturator, or to introduce into it a condensation pot with a syphon, in order to prevent condensed liquid running into the saturator. This did not prove an effective remedy, but the trouble was entirely removed when lead piping was substituted for iron after the evaporator.

Reports of the Commissions.

The reports of the various Commissions show that they have been actively engaged on their specialized subjects. Some interesting matters were discussed by the Gas-Works Chemists' Commission, to which we may be able to refer later. The Pipes Commission reported that the tests, which have now been in progress for some time, on a long stretch of high-pressure main in the Thyssen district are now so far advanced that the Gas Institute will shortly be able to publish their conclusions, which aim at verifying or disproving hitherto accepted formulæ for resistance factors.

Proceedings at the Meeting.

The first sitting of the meeting opened with a surprise, when it was announced that quite unexpected numbers were in attendance; over 1000 members having applied for admission cards, in spite of the remoteness of the venue, and the difficulties due to its being no longer a German city.

The President, Herr Jokisch, of Göppingen, after the usual greetings, paid a tribute of respect to the memory of members who had died during the year, especial mention being made of Dr. Hans Bunte. The Bunsen Pettenkofer tablet of honour, which is annually bestowed upon some member who has deserved well of the industry, was then presented to Prof. Dr. Junkers. His work generally, the President remarked, has been an inspiration to the industry in Germany, and the Junkers calorimeter is used wherever there is gas.

Past, Present, and Future.

In his address, the President reminded the meeting that this year sees the hundredth anniversary of gas-making in Germany. In the then political and industrial conditions of the country, it was left to the English, who possessed the necessary enterprise, capital, experience, and men, to open the first gas-works in Hanover and Berlin. It was not until the 'fifties or 'sixties that any considerable number of cities joined in what, even then, was still considered a doubtful enterprise. There is owing a debt of gratitude especially to the German Continental Gas Company and the Thüringen Company for the manner in which they have always assisted the expansion of the industry.

The speaker then referred to Auer von Welsbach—Bunsen's famous pupil—and stated the fact that, shortly before the war, Germany was manufacturing annually 120 million incandescent mantles. From development in gas-making methods and in commercial directions, he passed on to consider what is the present condition of the industry, and what foundation there may be for the oft-repeated forecast of its early demise. The answer, in his opinion, is that it stands to-day upon firmer foundations than ever. The estimated 1925 consumption shows more than 14 p.ct. increase over pre-war figures. The building and rebuilding that are taking place in gas-works everywhere signify ample confidence in the future. The zeal and success with which research is being carried on, and the frequent advances which are made in all branches of gas manufacture, indicate that this confidence is likely to be justified.

The Papers.

Most of the papers dealt with matters from the purely German national aspect. For instance, Herr zur Nedden had as his subject the position of gas in relation to energy production generally in Germany, and Dr. Gerstner discussed certain economic problems in connection with municipal gas undertakings. Herr Ludwig read a paper describing some of the characteristics of the gas industry in the United States, and Herr Arnhold dealt with the human factor in industry. Professor Drawe, of the Berlin Technical University, discussed the possibilities of high-calorific gas and liquid fuel as the sole

ultimate ends of coal carbonization. Most modern methods, he said, include also, of necessity, some kind of solid fuel, which, at any rate as regards weight, forms the bulk of the products of carbonization. Since, however, high-calorific gas and liquid products are the essentially valuable results, the speaker tried to envisage a state of affairs in which the whole of the useful constituents of coal could be converted into these. Such methods as the tri-gas and double-gas processes are steps in this direction, but their great defect is that they do not permit of continuous working. Prof. Drawe wondered whether it would be commercially practicable to gasify a solid fuel with the help of an oxygen-water vapour mixture in such a way as to produce a high-quality gas, with tar as a bye-product. The cost of oxygen would, of course, be one of the deciding factors. Given an 85 p.ct. degree of purity of the oxygen, then, from 1 lb. of coal there should be obtainable about 29 c.ft. of gas of 380 to 400 B.Th.U. At present prices of coal and oxygen, the cost of this would work out at approximately that of water gas.

A COMPLIMENT TO THE INSTITUTION.

A most successful meeting closed with the elections of officers and Commissions for the ensuing year. Herr Jokisch is succeeded in the Presidency by Herr Kühne, of Berlin.

It was announced that an intimation had been received from the Secretary of the Institution of Gas Engineers that the Council were to propose, at the forthcoming general meeting, the election, as honorary member, of the President for the time being of the German Association. It was unanimously agreed, on the proposition of Herr Jokisch, that the English President be forthwith nominated an honorary member of their Association.

Cassel was decided upon as the venue for next year's meeting.

COMPLETE GASIFICATION BY THE TULLY PROCESS.

[From a paper read by M. Bernard before the Société Technique.]

The chief technical paper presented to this year's congress of the Société Technique was by M. Bernard, and described fully the Tully complete gasification plant. The Tully system is familiar to our readers; but M. Bernard introduced a few general considerations which are worthy of reproduction.

As for the advantages of complete gasification, he points out that blue water gas is of very constant calorific value, so that there is perforce little variation in the quantity of it which one can admix with the make of coal gas; and further, during the slack period of the year, water gas plant has often to be let-down, which incurs waste of fuel and a decreased output per man. With complete gasification plant, on the other hand, one has a wide range of calorific values at command, and consequently a much greater flexibility; and the cost of production of one's "peak" gas is more under control. Except at periods of depression in the coke market, complete gasification gives cheaper therms than does water gas plant. The author names the three chief systems of complete gasification as the Rincker, the Strache, and the Tully.

After pointing out that the Tully plant can gasify all grades of material from coke to rich coal, M. Bernard details the coal characteristics which he considers best. The coals must be freely coking; they must be able to pass easily through the retort so as to avoid hanging-up, and at the same time offer a ready passage to the off-coming gas; and the ash content must be low enough to avoid difficult and prolonged clinkering periods. He therefore recommends for complete gasification coal of the following characteristics:

Volatile matter	28 to 35 p.ct.
Ash content	below 10 p.ct.
Caking index	below 75.
Size	above 20 mm.

A table (reproduced) shows results obtained from various coals and coke in a Tully plant of 14,000 cub.m. per day capacity.

As for the tar, one can recover 48 kg., containing 20 to 30 p.ct. of water, per tonne of coal; its density being 1·085, and calorific value 8997 calories. Tests after preliminary separation of the water gave the following result:

Colour: Dull brown-black.
Density at 15° C.: 1100.
Fractional Distillation—

Water	7·8 p.ct.
Up to 170° C.	2·5 ,,
170° to 230° C.	7·6 ,,
230° to 270° C.	8·0 ,,
270° to 340° C.	22·0 ,,
	47·9 ,,
Pitch	52·1 ,,

M. Bernard, carrying out a 48-hour test of the plant with the mixture of Marles coal and No. 1 coke specified above, found an efficiency of 49·4 p.ct., or 55·2 p.ct. when the waste-heat boiler was taken into account.

Test of ½ Million C.Ft. (approx.) Tully Plant.

Coal, &c, Gasified.	Roeden-flamm (Sarre).	Luisenthal (Sarre).	Mathilde (Silesian).	Sutton Cobbles.	Marles 20/80.	Marles 20/40.	Bruay 20/40.	75 P.Ct. Marles 25 P.Ct. Coke No. 1.	Coke No. 2.
Coal Analysis—									
Water	3·93	4·22	5·08	32·6	4·92	3·03	2·25	..	..
Volatiles	32·27	36·78	31·82		35·48	29·67	32·35	..	..
Ash	11·60	9·50	7·30	4·2	8·30	7·60	8·40	..	..
Fixed carbon	52·20	49·50	55·80	63·1	51·30	59·70	57·0	..	..
Caking index	55	50	60	..	75	72	75	..	..
Cub.m. per metric ton	1,300	1,250	1,250	..	1,190	1,280	1,200	1,300	..
C.ft. per ton	46,600	44,900	44,900	..	42,600	46,000	43,000	46,600	..
Cal. per cub.m.	3,200	3,150	3,250	3,165	3,170	3,130	3,215	2,900	2,700
B.Th.U. per c.ft.	355	350	361	352	352	348	357	323	300
Gas Analysis—									
CO_2	5·6	7·4	6·58	6·4	6·6	4·80	10·70	7·50	5·6
C_nH_m	0·8	0·6	0·39	0·8	0·56	0·6	0·8	0·6	..
O_2	0·4	0·6	0·2	0·4	0·19	0	1·20	0·9	0·6
CO	35·3	31·6	29·5	29·4	29·0	31·25	24·10	30·0	35·4
H_2	47·8	..	46·3	46·0	46·70	48·19	45·0	45·2	..
CH_4	4·8	..	8·35	6·0	9·65	9·12	9·60	7·8	..
N and balance	5·4	..	8·68	11·0	7·30	6·04	8·60	8·72	..

CANADIAN GAS ASSOCIATION.

(*Continued from p.* 320)

HEATING INSTALLATIONS IN VANCOUVER.

Hot water, warm air, and "Rector" vacuum heating systems were discussed by Mr. John Keillor (Gas Engineer to the British Columbia Electric Power and Gas Company), in a paper entitled "Gas Heating Installations in Vancouver."

Some details of the "Rector" vacuum gas heating system we were enabled to give in the "GAS SALESMAN" for July 26, 1922, as the result of an interview with Mr. Keillor, when he was over in England at that time. It was explained then that, fitted in each of the rooms to be heated is a cast-iron radiator, with a burner box and valve in the centre. These radiators are connected to a system of exhaust piping—made of a substance to withstand corrosive effects. A small electric fan is placed in the basement of the premises, and joined-up with this piping system; and an exhaust on the outlet side of the fan passes to the chimney. To put the plant into operation, an electric switch is turned on, which starts-up the motor, and this immediately produces a vacuum equal to 2 in. water column, which draws the products of combustion from the burner boxes through the radiator coils, and down through the piping system, past the fan, and into the chimney. The gas-valves on each radiator are operated by the suction produced by the fan and the thermostats, one of which may be placed in each room. With this system, each separate room may be kept at any desired temperature, without regard to the temperature of any other room; while it is as easy to operate as a gas fire, and produces a greater heating effect than the most elaborate water-

circulating system. The burner employed is of a specially designed bunsen type, and is easily controlled so as to consume about 20 c.ft. per hour for each radiator.

In Vancouver gas heating engineering is regarded as a highly specialized branch of the Sales Department. An experienced engineer, trained in the science of gas heating, gives advice, prepares plans and estimates, and assists in the supervision of installations, as well as in the training of the district salesmen in gas heating engineering. With the following six types of gas heated devices the Company can, said Mr. Keillor in his paper, successfully instal plants in any kind of premises: (1) Hot water gas-fired boilers, automatically controlled; (2) warm air furnaces, gas fired, automatically or hand controlled; (3) the improved vacuum system (" Rector ") hand controlled; (4) gas-steam radiators; (5) " Armco " iron radiators; and (6) gas radiant fires of selected types. The first three are regarded as central heating plants, and are sold as such in competition with coal, wood, and oil burning apparatus. There are locations applicable to all three types. The Company refuse to instal any type of gas heating appliance that is not vented. " Urastone " pipe is utilized for venting, and for the vacuum system. It is impervious to rust, and is more easily installed than iron pipe. In some cases two types of gas heating are recommended for the same premises.

Mr. Keillor's Company do not allow their district salesmen to decide the type of plant to be installed; for it is of vital importance to the ultimate success of a gas heating department that such decisions should be made by a man skilled in the work. The Company guarantee satisfactory operation of installations made by them. For hot water heating the charge for gas is 60c. per 1000 c.ft. for all consumptions. In the case of all heating plants other than hot water boilers, gas is sold for heating at:

75c. per 1000 c.ft. for the first 10,000 c.ft.
60c. ,, ,, ,, for all over ,, ,,

Monthly consumptions.

All heating gas is measured through a separate meter, and all users are required to sign a contract guaranteeing a minimum charge of 75c. per month for seven months, October to April inclusive, and 25c. a month from May to September inclusive. A low minimum monthly rate is charged in order to encourage the small users of gas for heating. There are altogether 1199 separate gas heating installations of all types in Vancouver. The gas used for heating buildings last year was 77,493,900 c.ft., or 11 p.ct. of the total sales. This is nearly all new business obtained in the last six years; and the Company regard the results as very satisfactory, considering the size of the city. It is anticipated that the percentage of gas sold for heating buildings will grow rapidly. Each year the number of installations nearly doubles that of the year before.

There are, Mr. Keillor remarked, two kinds of gas companies to-day in the business—gas companies who sell gas appliances, and gas companies who sell gas appliances and central gas heating plants. The gas companies who hope to sell successfully central gas heating plants in addition to gas appliances must radically change their selling methods, and employ expert salesmen who thoroughly understand the heating business. The development of the gas heating branch of the business in the past few years recalls the development of the gas cooking business thirty or more years ago. The general use of gas for heating, he believes, will develop faster than it did in the old days for cooking. It has developed faster in Vancouver; and it will do so in any city, if the gas company will only take the lead in their own towns, and show the architects, heating engineers, plumbers, contractors, and the public generally that gas can be sold for heating buildings on a large scale. It surprises him to find how little effort is being made in some cities to obtain this big business. Gas companies have nothing to fear, if they scientifically develop the heating business. Gas heating is the biggest field they ever had to develop, but it has to be developed courageously. Electricity, if it ever comes, is a long way off—that is, for central heating plants. But now is the time for gas companies to get firmly established in this branch of the business.

Mr. Keillor attributes principally to the following factors the success that has attended the efforts in Vancouver to sell gas heating plants:

That the management of our Company and the sales staff were themselves absolutely " sold " on the idea of gas heating.

That we ourselves had such confidence in gas heating that we installed it in our head office and other branch buildings in the city.

That we have established a rate for gas for heating which enables us to compete with coal, wood, or oil; the relative efficiencies of the various types of gas heating plants being emphasized.

That our gas heating experts are qualified to recommend the types of plant best suited to the buildings to be heated.

That we give efficient and courteous service after the plants are installed.

Synthetic Motor Fuels.

Some portions have been extracted for publication in a later issue of the " Journal " of a paper by Dr. R. T. Elworthy, of the Division of Chemistry, Mines Branch, Ottawa, entitled " The Use of Water Gas and Coke Oven Gas for the Production of Possible Gasoline Substitutes." In this paper he dealt with the conversion of carbon monoxide and hydrogen into synthetic fuels. The author is convinced that either the petroleum industry or the gas industry must take up the development of the new processes to which his paper referred. The gas industry, he said, has many initial advantages. The gas making and purifying plant may be considered installed. Compressors, capable of compressing gases from 200 to 1000 atmospheres are now being produced in Europe by the leading makers. It may not be long before the gas industry is much more commonly distributing gas under high pressure. Storage under pressure is coming in, and large compressors for distribution may be required. The catalyst bombs and the necessary condensers and washing towers would give rise to few problems for gas engineers.

Toronto Gas-Works Extensions.

Mr. C. G. Herring, Chief Draughtsman in the Works Department, gave details of some recent extensions of the coal gas manufacturing plant at Station " A " of the Toronto Consumers' Gas Company. Station " A " is centrally located in Toronto, within three-quarters of a mile of the hub of the city, and close to the main cross street, so that the avoidance of smoke, dust, and other nuisances is of prime importance. Again, adjacent to the retort house is a large knitting mill, employing several hundred women.

After careful consideration it was decided to adopt the Glover-West continuous system of vertical retorts, and a contract was given to West's Gas Improvement Company for the installation of eight settings (with provision for a ninth) of eight 40 in. by 10 in. by 25 ft. long " steaming " retorts. To accommodate the increased height of the vertical settings, it was necessary to dismantle the existing roofwork; and the side walls were carried up 12 ft. in the same architectural design. A new roof was provided, and the weight of the trusses carried mainly from the coal bunkers above the retort settings, which in turn are carried from the main front and back buckstays. The steel trusses were ingeniously designed with hinged joints and roller guides, to accommodate vertical expansion of the setting steel work, and to avoid any incalculable stresses due to such expansion. The waste heat from the vertical retort plant is utilized in two horizontal " Kirke " boilers by Messrs. Spencer-Bonecourt, Ltd.

Other new plant includes two rotary steam-driven Bryan Donkin exhausters, each of 500,000 c.ft. per hour capacity. There are also two Livesey washers, erected in front of a " Standard " washer-scrubber, by Messrs. W. C. Holmes & Co. The liquor from the latter flows by gravity to the Livesey washers. The contract for a set of four dry-seal purifying boxes 35 ft. square by 10 ft. deep was entrusted to Messrs. Ashmore, Benson, Pease, & Co.

The following advantages were quoted by Mr. Herring as having led to the decision to erect a tankless gasholder:

(1) Larger contents for a given area, in comparison with the old type.
(2) Constant pressure thrown.
(3) No steam during the winter season—a saving equal to 600 B.H.P. per hour for a period of at least 160 days in this climate.
(4) The entire absence of water tank or seals.
(5) Elimination of heavy tank foundations in the majority of cases.
(6) Saving in maintenance (cost of painting); no parts dipping into water.
(7) No need for snow-shovelling gangs, common during the winter with the old type.

Industrial Gas Survey.

Holding the opinion that the time has arrived when gas companies must, where they have not already done so, place their industrial departments on a sound businesslike basis—must lay plans for expansion as does any business of a competitive nature, and become as aggressive as their competitors—Mr. H. W. Hayward (Director of the Research Institute, Combustion Utilities Corporation, New York) contributed a paper entitled " The Industrial Gas Survey—Purpose, Procedure, and Benefits." He advocated an accurate survey, which will give such information to the management that they will have a complete picture of their industrial possibilities, which will in turn show whether there is a justification for their going after this type of load. If there is a justification, the survey must give a basis upon which they can intelligently set out to obtain the load. The correct industrial survey must be one which when completed can be used to advantage in all departments of the gas company, whose separate functions may in turn be co-ordinated to secure and retain an industrial load at the lowest possible over-all cost per 1000 c.ft. of gas sold. It will involve much detail work to secure information that is vital for proper analysis and planning.

New Business Department.

The value of a strong, aggressive New Business Department was urged by Mr. Alton Jones (Chairman of the Executive Committee of Messrs. Henry L. Doherty & Co.), on the following grounds: (1) It will add tremendously to revenue, and pay its cost with a large profit besides. (2) It will go far towards establishing a company upon the proper basis with the cus-

tomers, by the dissemination of important facts about the business.

Public utilities, the author remarked, do not sell commodities alone, but render a service. It is impossible to render a complete service in the public utility business without maintaining an intimate contact with the public served. The more personal one can make this contact, the more satisfactory it is likely to be. In the United States for many years the importance of maintaining an intimate contact with the public was not appreciated by public utility operators. It was felt that with the securing of a franchise to operate on the streets of a community, the public utility's interest in civic affairs and the public at large ceased. This view became so general on the part of the public utility operators that they earned the reputation of being arrogant, unmindful of the public interest, secretive in their practices, and generally unjust in their dealings with the public. With this reputation there came a wave of unpopularity of public utilities which swept the entire country. There was no differentiation between the good and the bad; and while the operators were never guilty of many of the things with which they were charged, and while most of them had always rendered a fine public service, the entire industry paid a tremendous bill for apparent indifference to and neglect of public opinion.

These trials and tribulations, however, served one great purpose. They brought the utility industry to a realization of the fact that their relations towards the community were not as wholesome as they should be, and that something must be done within the industry to change that condition. A movement which had been started years before, but which had attracted only incidental attention, was immediately taken up, and has, in the last few years, worked wonders in the restoration of public confidence and the rehabilitation of the credit of utility companies. This movement is known as the Public Relations Movement. As a part of this activity a number of unusual methods have been employed; and as examples Mr. Jones quoted the following:

Wider distribution of securities of public utility companies among customers.

Institutional or goodwill advertising, in which the policy of the company is made known to its customers by use of the daily newspapers as the principal medium, and the employment of various other national media.

Public speaking courses conducted before business clubs and associations, through which medium the people are advised of the problems confronting the industry.

The establishment of public information bureaux, through which news of interest about the public utility industry is disseminated.

The establishment of well-organized New Business Departments for the active solicitation of additional business from present customers, the seeking of new customers, and the rendering of a tangible personal service which will improve the standing of the company in the eyes of the general public.

All the foregoing methods are salesmanship in one form or another. The last-mentioned is direct salesmanship; and the companies who have employed well-arranged new business or sales organizations have found that this was the most effective of all of the public relations plans.

History of Water Gas.

Mr. T. W. Stone, Chief Engineer to the Western Gas Construction Company, of Fort Wayne, in a historical review, said that from the beginning of the nineteenth century there were curiosity and experimenting in, and trials of, water gas in a crude way. In the 'fifties and 'sixties things had advanced until there were workable plants. It was, however, not until 1875 that apparatus developed embodying the fundamental features of the machine of to-day. Of the forms which appeared during this early period, the Lowe type, due to inherent correctness of its early principles and its later developments, has survived out of an intense and interesting competition for a place in the industry.

The various developments down to the present day were described by the author, who, referring to the waste-heat boiler, stated that one of the greatest wastes in water gas operation during the 75 years of its use has probably been the heat in the blast gases from the superheater. Lowe indicated the desirability of conserving this heat in his original design, which showed a waste-heat boiler at the outlet of the stack; and Glasgow in later years lamented the fact that no satisfactory means had been provided for pre-heating the blast or conserving the heat from the stack gases. Waste-heat boilers have been in use in some installations, but not in great proportion for any number of years. A few employ the heat from the run gases as well as from the blast gases.

In the last eight or ten years, the use of a vertical fire-tube boiler on blast gases only has been the more generally accepted practice; and within the past four or five years a water-tube boiler has been employed in a great many installations and proved quite satisfactory—though this latter form is usually more expensive than the fire-tube type.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Flexible Gas Production.

SIR,—With regard to the article in the "JOURNAL" for July 28, entitled "Flexibility with Standardization in Gas Manufacture," I refrained from writing on this matter until I had examined a copy of patent specification No. 246,459, "Improvements relating to the Generation and Distribution of Gas," referred to in that article. The specification has now come to hand; and after studying it, I think it may be of interest to some of your readers if I refer to a method of mixing gases similar to that described in the specification. It was first tried out in actual practice over two years ago, and has been in regular working at Southend for a long period.

The method adopted at Southend is to manufacture a good-quality coal gas, and to mix with it producer gas of an average quality of 130 B.Th.U; the producer gas being generated in a separate plant of our own design. The resultant mixture, having a specific gravity approximating as nearly as possible to that of carburetted water gas, is manufactured in as constant a volume as practical working will permit, and is mixed with a varying volume—ranging from zero to 60 p.ct., and sometimes higher—of carburetted water gas, according to demand, in order to cope with peak loads. There are periods during days of light loads when the water gas plants are shut down entirely, and a mixture of coal gas and producer gas alone is made. We have found in practice that this method of working entirely obviates any complaints from consumers, or the necessity for any adjustment of apparatus.

A method of working similar to the above has been in operation at Southend since 1918, with the difference that no independent producer gas plant was used to raise the specific gravity of the coal gas; this being effected by suitable modification of the working of the retort house, the water gas plants being operated intermittently to pick up peak loads. How essential was such a system of working may be gathered when I quote, as one instance of the peak loads that had to be dealt with, the total output for Christmas Day, 1923, of 3,227,000 c.ft., with a total holder capacity of only 1 million c.ft.

As to the question of the supply of gases of different composition in specified districts, I should like to refer to the purchase by my Company of the Leigh-on-Sea gas undertaking from the Southend Corporation in March, 1923. For many years prior to this date the Corporation, in cases of emergency and to carry peak loads for admixture with straight coal gas, purchased gas in bulk from Southend; and I can well recollect their former Engineer telling me how the burners and apparatus on his district were upset on such occasions. When we took over the undertaking, straight coal gas was still manufactured at Leigh, but all peak loads were met by gas supplied from Southend; the consumers' burners and apparatus being adjusted to the latter gas. At the same time the specific gravity of the straight coal gas manufactured at the Leigh Works was raised to that of the Southend gas; the qualities being kept equal. No further trouble was experienced with the consumers' burners and apparatus after these modifications were completed. During periods of light loads in the Leigh district the straight coal gas manufactured at the Leigh Works was boosted into the Southend district without causing any trouble with the consumers' appliances. Since the manufacture of gas was discontinued at the Leigh Works (in June of this year) the whole of that district has been supplied with Southend gas without any complaints being received, or any adjustments required to the consumers' apparatus. Recently the Southend mains have been connected to the Rochford district, which for many years has been run from a separate works making straight coal gas. In this case we reversed the process carried out on the Leigh district by adjusting the consumers' burners and apparatus to coal gas of high specific gravity manufactured at the Rochford Works; and no complaints are received or adjustments required to consumers' apparatus when Southend gas is supplied to this district either alone or mixed with Rochford gas in any proportions.

During labour troubles at Southend in 1919 and 1921, the town was supplied with neat carburetted water gas of the same quality as the normal mixture of coal gas and water gas; and no trouble was experienced on the district.

My Chief Assistant, Mr. R. G. Clark, has been intimately associated with me in these methods, in the development of a suitable type of producer gas plant, and in the application of it to our present system of working; and I should like to take this opportunity of paying a tribute to the painstaking care and ability he has brought to bear on the design of the plant and its application to practical working.

In instituting these systems at Southend there has been prominently before us the old slogan: "Keep your gravity constant;" and we claim no novelty in putting so ancient a dictum into every-day practice. Prior to the introduction of the present system embodying the producer gas plant, Southend, unlike Mr. Cook, remained faithful to its slogan, and kept the gravity of its gas constant by the methods described in the third paragraph of this letter.

THOMAS F. CANNING,
Engineer and Manager.

Southend-on-Sea and District Gas Company,
Aug. 14, 1926.

REGISTER OF PATENTS.

Gas Purification.—No. 255,139.

MELLERSH-JACKSON, W. H., of 28, Southampton Buildings, E.C. 4.

No. 9675; April 14, 1925.

[Communication from the Koppers Company, of Pittsburgh.]

This invention relates to apparatus for the aeration of gas-purification liquids, with or without precipitation therefrom of sulphur or other suspended matter, and also for the flotation of sulphur, with its removal as foam. The object of the invention is to provide an aeration apparatus in which the aerating partition automatically frees itself from any solid matter that may be deposited.

No. 255,140.

No. 9679; April 14, 1925.

This invention relates to a process and apparatus for the elimination of H_2S and other acidic constituents from gases, from which the ammonia has already been removed, by liquid purification employing a suspension of an iron compound in an alkaline liquid, which may be revivified by aeration. The ideas underlying the invention are to accelerate the purification of the gas and to facilitate the separation of sulphur from the liquid. The apparatus comprises an absorber, an aerator equipped with a minutely porous partition, and means for forcing air through the latter into the liquid in the aerator. It also includes a system for circulating wash liquid to and fro between the absorber and the aerator, and heating means for maintaining the liquid in the absorber and the aerator at a desired temperature.

No. 255,141.

No. 9681; April 14, 1925.

This invention is a development of the inventions described in patent specifications Nos. 238,172 ("JOURNAL," Vol. 173, p. 103) and 190,116 ("JOURNAL," Vol. 165, p. 318).

The primary objects are to render the procedure more flexible, so that the separate stages may be carried out without interfering with the operations of other stages, and to obtain complete elimination of H_2S. The invention consists broadly in washing the gas first with a suspension of a metallic compound in a liquid of relatively low alkalinity, and then in a similar suspension but of higher alkalinity. The suspensions from the washing stages are separately revivified.

The apparatus for carrying-out the process comprises a plurality of absorbers associated with a plurality of thionizer devices (the latter are described in the "JOURNAL" for Aug. 4, p. 262) by means including a system of pipe connections whereby any absorbers may be coupled with any thionizer.

The invention also consists in a modification of the process. The gas may be washed in one or more stages with a suspension in an alkaline liquid of a metallic compound; the suspension may be maintained in an alkaline state; the spent liquid may be revivified by aeration; and the spent liquid entering the revivification stage may be kept in a neutral or slightly acid condition.

No. 255,142.

No. 9690; April 14, 1925.

The object of this invention is to provide an efficient gas and liquid contact apparatus suitable for carrying out either the absorption stage or the regeneration stage of the liquid purification process. The apparatus—which, the patentees mention, may be useful for benzole scrubbing—must be cheap and simple to construct, and must offer the minimum of resistance to the flow of gas.

A filler is provided presenting a multitude of openings to the flow of the media. It is composed of successive layers of distributive and contact filler. The former are composed of elements having all their surfaces oblique to the flow of both media; the latter are composed of elements having all their surfaces parallel to the flow of the media.

No. 255,143.

No. 9694; April 14, 1925.

The object of this invention is to overcome the noxious-fumes nuisance in connection with the aeration stage of the liquid purification process. The invention consists in treating the gas by contact with a liquid containing in suspension a solid reactive to H_2S, whereby the latter is absorbed. A large proportion of the sulphided solid is removed as a sludge, which is then oxidized under such conditions that free sulphur is formed and no sulphur is oxidized.

No. 255,144.

No. 9698; April 14, 1925.

The primary objects of this invention are to provide a simple and efficient method of actifying the spent purifying liquid after contact with the gas, and to simplify and cheapen the apparatus necessary for the purification. The patentees claim a process for removing H_2S and other acidic constituents from gases free from NH_3, by washing the gases with a dilute solution or suspension of an alkaline compound which is revivified by heating or aeration. A metallic chloride is added to the dilute wash liquid; and this chloride is capable of reacting with the water to form HCl in the revivifying stage, to facilitate in the expulsion of H_2S, &c., from the liquid in that stage. Preferably the wash-liquid employed is a dilute aqueous suspension of MgO and $MgCl_2$.

No. 255,145.

No. 9701; April 14, 1925.

The object of this invention is to increase the efficiency of the revivification stage in the process of specification No. 255,144, so that a revivified suspension may be furnished which more nearly approaches a freshly-prepared suspension. The invention consists in maintaining a peptizing or anti-coagulating agent—for example, glycerine—in the suspension. The glycerine prevents coagulation of the particles in the suspension, which is believed to cause the revivified liquid to be less active than a freshly-prepared suspension.

Gas for Cutting Metals.—No. 255,250.

HARRIS, J., of Cleveland, Ohio.

No. 20,807; Aug. 19, 1925.

This invention consists in a gaseous fuel comprising a mixture of a gas having a high igniting point and a low flame temperature, such as artificial illuminating gas, with the vapour of ether, in substantially the proportion of about 200 c.ft. of the former to the vapour evolved from about 1 lb. to 2 lbs. of ether.

As the composition of the "ordinary" gas to be used, the patentee gives:

Percentage by Volume.

CO_2	2
Illuminants	4
O_2	0·5
CO	8
H_2	47
CH_4	32
N_2	6·5

A convenient manner of saturating or impregnating the gas with ether is by introducing into a cylinder containing about 200 c.ft. of gas from 1 lb. to 2 lbs. of commercial ether. When the delivery valve is opened, the gas impregnated with the ether vapour will be supplied to the blowpipe, and the latter may be operated with oxygen in the usual manner. Ordinary blowpipe tips may be used.

Where the gas and ether are mixed with the lower proportion of ether present, the resultant mixture will enable metal plates to be cut quickly and cleanly; while, if the ether be present in the higher proportion mentioned, a mixture will be produced that is suitable for the cutting of heavy metal as well as for the cutting of rusty plates and masses of metal. While commercial, or ethyl, ether is preferred for admixture with artificial gas, because of its richness in carbon and hydrogen, the invention contemplates the use of methyl ether as well.

Preferably the gas in the cylinder is under a pressure of from 1800 to 2000 lbs. per sq. in. at 70° Fahr., depending somewhat upon the constituents of the illuminating gas.

Gas Making Plant.—No. 255,279.

PARKER, A., of Leeds.

No. 25,032; Oct. 7, 1925.

This invention relates to apparatus for gas making and coal carbonization of the kind embodying a water gas generator in combination with vertical retorts arranged within a casing connected

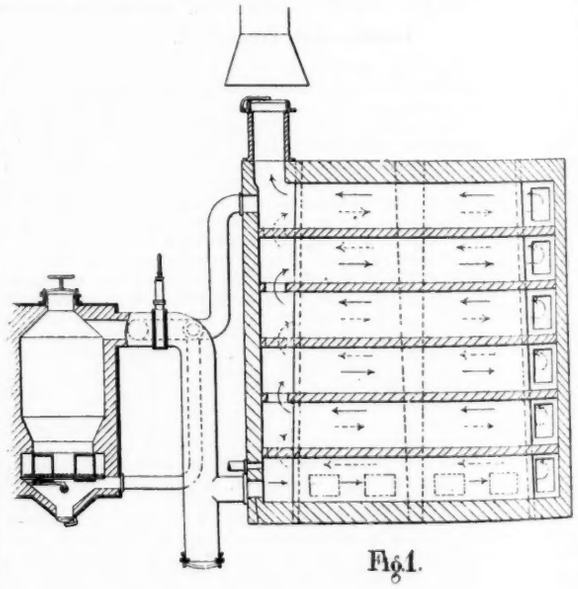


Fig. 1.

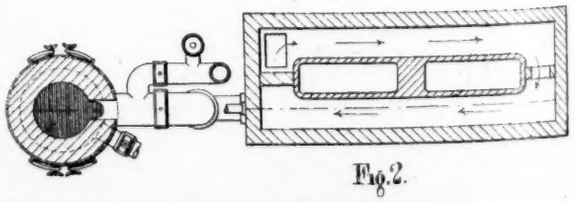


Fig. 2.

Parker's Gas Plant.

with the water gas generator, the water gas passing through the retorts during the carbonizing operation.

The object of the present invention is to devise improvements in the construction and arrangement of apparatus of the above character which will enable the carbonization to be more efficiently carried out than hitherto, and will prevent the loss of distillation products during blow periods and clinkering operations.

The accompanying drawings illustrate one mode of carrying out the invention. Fig. 1 is a longitudinal sectional elevation of one convenient form of apparatus, and fig. 2 a plan.

It will be observed that the generator and retorts are provided with suitable connections such that the blow gas passes from the generator into the chambers surrounding the retorts. The chambers are so arranged that air may be admitted to burn therein a portion or the whole of the blow gas as desired, thus raising the temperature of the carbonizing vessels and surrounding chambers; and during such blow period the gases leaving the chambers may be blown away direct to the stack or utilized for raising steam or for other heating purposes, or may be passed partly or wholly through the material undergoing carbonization.

The water gas produced during the run passes through the chambers surrounding the retorts, so that in this way the temperature of the water gas will be raised; and if desired such temperature may be further raised by partial combustion by the admission of air. The water gas thus preheated passes from the chambers direct through connecting flues (and not through a seal or other like device which would result in the cooling of the gases) into the carbonizing vessel, travelling upwards through the material undergoing carbonization; the retort gases being taken off from the top of each retort through any suitable outlet fittings (not shown).

The retorts may be of the continuous or intermittent type, and the rate at which the coal or other fuel passes through in the former case, or the duration of carbonization in the latter case, may be varied according to the amount and nature of the products required in different circumstances.

The invention enables the material to be carbonized at high, medium, or low temperatures; and by suitable regulation of the rate of carbonization it may be arranged that the amount of carbonized fuel withdrawn from the retorts exactly meets the requirements of the water gas generator, when the process will be one of complete gasification. Alternatively, the rate of carbonization may be increased to yield amounts of fuel ranging up to several times the weight of fuel consumed in the generator; and if desired the latter may be supplied partly or wholly with fuel other than that withdrawn from the retorts.

In order to prevent the loss of distillation products during the blow periods when the stack valve is open, or during clinkering, a by-pass is provided in the gas main with an exhauster associated therewith, the speed of the exhauster being regulated to suit any practical requirements.

Carriages for Spiral-Guided Gasholders.

No. 255,367.

MILBOURNE, R. J., and BEARD, G. F. H., both of Newport (Salop).

No. 6733; March 10, 1926.

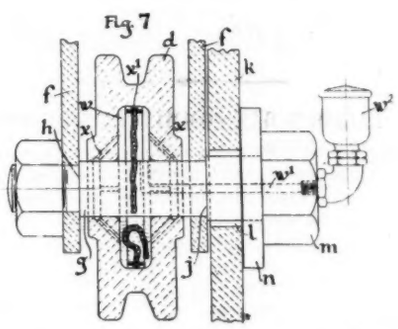
The patentees, referring to the rollers and carriages of spiral gasholders, remark that the overhung axle is a source of weakness, as a small amount of "spring" therein allows the clearance between the rollers and the spiral rail to be increased; and should any permanent set take place in the axle through overstrain, then the carriage becomes inoperative, and in consequence a greater load is thrown upon the adjacent carriages. Further, whatever the diameter of the axle may be, the cantilever action exerts an enormous crushing strain on the extreme edge of the carriage.

The main object of this invention is a construction obviating the described disadvantages, and allowing the roller axles to be supported at both ends in the carriages instead of at one end only. It also dispenses with the pivots for the carriages.

Figs. 1 and 2 are, respectively, a side elevation and a vertical section of a portion of a holder illustrating one form of the invention. Fig. 3 is a plan view of a portion of figs. 1 and 2. Fig. 4 is a section on the line 4—4 of fig. 1. Fig. 5 is an elevation of the supporting bracket shown in figs. 1 to 4; and fig. 6 is a view of a portion thereof, but to a larger scale.

In these, *c* is the carriage for each pair of rollers *d*, *d*, and *e* is one of the fixed brackets on which the carriages are arranged with their rollers in contact with opposite sides of the rail *b*. *f*, *f* are the pair of plates constituting each carriage, and between which are secured the axles *g* on which the rollers *d* rotate.

One end of each axle *g* is shouldered as at *h* to bear against the inner surface of one plate *f*, and is secured thereto by a nut *i*, while the other end of the axle is formed with a shoulder *j* which bears against the outer side of the other plate *f*. *k* is the upright wall of the bracket *e* parallel with the walls of the carriage; and *l*, *l* are the holes for the free passage of the axles. The holes *l* are sufficiently large to allow of lateral movement of the axles. *m*, *n* are, respectively, the head and washer on each axle to prevent displacement of the carriages away from the bracket wall *k*. The base *o* of the bracket *e* is supported by the fixed part or framing *p* of the tank or dip channel of the holder. *q*, *q* are the abutments on the brackets *e* for supporting the carriages with their rollers in contact with the rail *b*, the faces of the abutments being of concave form, and *r*, *r* are corresponding convex abutting surfaces on the carriages. It will be seen that these abutting surfaces, in addition to taking any thrust set up by the rail *b* in its up and down spiral movement, also allow the pairs of rollers of each carriage to maintain contact with the rail notwithstanding any deviation from the true spiral that it may possess or movement that may take place due to the action of the gasholder; the carriage turning or rocking with respect to the abutment.



Section through Roller and Axle, showing Lubricating Arrangement.

A series of drawings is included in the specification to illustrate each of two modifications of the above arrangement.

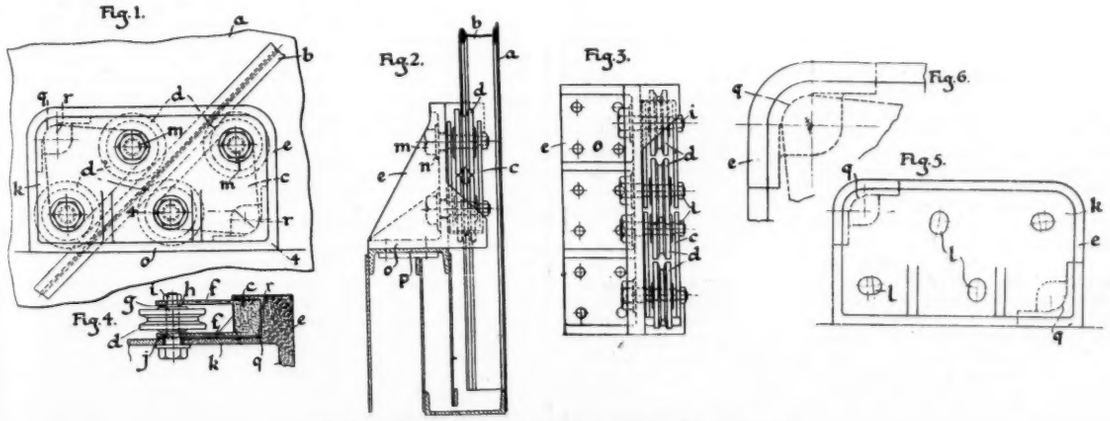
Lubricating devices are also the subject of a claim, and one form of these is shown in fig. 7. In this, *w* is a space formed in each roller *d* to receive lubricant through the conduit w^1 in the axle *g* from an oil lubricator w^2 secured to the axle head *m*; and *x*, *x* are the conduits for collecting the lubricant from the surfaces of the rollers bearing upon the axles into the space *w*. A wick x^1 is secured to the periphery of the space *w*, and its trailing ends make rubbing contact with the axle during the rotation of the roller, and distribute the lubricant thereon.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Aug. 11.]

Nos. 19,139-19,579.

DONALD, W.—"Derivation of oil and gas from coal." No. 19,441.
FLOOD, W. H.—"Gas lighters." No. 19,515.
MOLIN, A.—"Sizing apparatus for coke." No. 19,338.
OWENS, J. S.—"Open grate for burning coke." No. 19,473.
STILL, C. [Firm of].—"Eliminating sulphuretted hydrogen from gases." No. 19,303.



Guide Carriages for Spiral Holders.—Milbourne and Beard.

MISCELLANEOUS NEWS.

METER TESTING IN GLASGOW.

Reporting to the City Magistrates on the work of the Glasgow Gas Meter Testing Department during the year ended May 31 last, Mr. S. B. Langlands (the Inspector) says the total number of meters tested was 44,762, and the fees collected £2911. These figures are an increase on those of 1925. Of the total number tested, 21,456 were new meters, 22,892 were repaired, and 414 were sent in by gas consumers for certification as to correctness.

The equipment in the test room has been brought thoroughly up to date, to comply with the Gas Regulation Act, 1920, and now consists of six 10 c.ft. test holders (which are worked in pairs) and one 20 c.ft. test holder for testing large meters. A 20-light standard test meter (wet), for testing meters *in situ*, also forms part of the equipment. About a year ago an electric blower was installed for filling the holders with air instead of gas for testing purposes. This has worked satisfactorily and economically.

Summary of Results of Testing.

New Meters.		Repaired Meters.		Meters sent by Consumers for Certification.	
Correct and Stamped.	Rejected.	Correct and Stamped.	Rejected.	Correct and Stamped.	Rejected.
21,291 99·2 p.ct.	165 0·8 p.ct.	22,576 98·6 p.ct.	316 1·4 p.ct.	173 41·8 p.ct.	241 58·2 p.ct.

SALFORD GAS COMMITTEE'S REPORT.

The report of the Salford Gas Committee to the City Council for the year ended March 31 (which is signed by Alderman F. S. Phillips, J.P., as Chairman) states that the sales of gas show an increase over the preceding twelve months equal to 5·75 p.ct.

The coal carbonized during the past year amounted to 138,248 tons, as compared with 132,407 tons for the previous year. The quantity of gas made was 1,978,623,000 c.ft., against 1,882,014,000 c.ft. This is a record which has not previously been equalled in the history of the undertaking.

The total number of gas cookers, ordinary and prepayment, on hire at March 31 was 24,561, an increase of 1649 during the year; and the total number of gas fires on hire at the same date was 7295, an increase of 1149. These figures are very satisfactory, and indicate the extent to which gas is displacing solid fuel for cooking and heating, and thereby contributing to the abolition of smoke in the city and the area of supply.

The receipts from the sale of gas and rental of stoves show an increase of £30,781, due to the substantial increase in the sales of gas and to the increased price which came into operation on Oct. 1, 1925. Unfortunately, this increase is more than counterbalanced by reductions in the value of residual products, amounting to £17,955, and by the repayment of £15,000 borrowed from the borough fund at the end of the previous year.

The gross profit for the year amounted to £83,624, of which interest and redemption fund charges absorbed £57,983.

MR. F. W. SALISBURY-JONES AND LOW TEMPERATURE CARBONISATION, LTD.

The first meeting of creditors was held last week at the London Bankruptcy Court under a receiving order made on a moneylender's petition against Mr. Frederick Wm. Salisbury-Jones, of 27, Berkeley Square, W. Proofs of debt amounting to £216,300 were dealt with by Mr. Gaine, the Official Receiver; included in the number being one for £205,544 tendered on behalf of the Westminster Bank, Ltd.

Mr. H. A. MAGGS, representing the Bank, stated, in reply to the Chairman, that it held securities for the debt, but was unable at present to assess their value. The proof accordingly was allowed to stand over.

Mr. GAINE reported that it appeared from the debtor's statement in preliminary meeting that for 28 years past he had devoted his time to the carbonizing of coal, for which purpose a Company, now known as Low Temperature Carbonisation, Ltd., was registered in 1905, with a nominal capital of £5000, subsequently increased to £1,250,000. Practically the whole of his present unsecured liabilities, which he estimated at between £7000 and £8000, had arisen in connection with the Company, of which he acted as Managing Director until he resigned last August, owing to ill-health. He was the holder of shares to the face value of £80,000 or £90,000 in the Company, and did not admit insolvency.

The debt of the petitioning creditor was in respect of a promissory note for £1800, for which the debtor received £1300. He had asserted that he had repaid the whole amount of principal, together with a considerable amount for interest, but was still indebted for £2000 in respect of interest and costs, for which judgment had been obtained. The debtor had further stated that, but for the present coal strike, there was not the slightest doubt that he could have pulled matters through. It was his intention to pay all debts in full, and get these proceedings annulled.

Mr. G. G. KEMP (Messrs. Ashurst, Morris, & Crisp), on behalf of the debtor, asked for the meeting to be adjourned for two months to enable his client to submit a scheme to the creditors.

Mr. RUSSELL (Messrs. Russell & Hinlip) said he represented the Stock Exchange creditors, and supported the adjournment, being of opinion that they would get very little under an adjudication of bankruptcy, whereas the debtor's friends would doubtless assist him to bring in an acceptable scheme.

The meeting was adjourned till next October.

GAS REGULATION ACT APPLICATIONS.

There have appeared in the "London Gazette" the following notices regarding applications to the Board of Trade under the Act.

AMENDING ORDERS.

Ashburton Urban District Council.

The Council have applied to the Board of Trade for an Amending Order authorizing the substitution of the maximum price of 1s. 7d. per therm for the existing maximum price of 1s. 4d. per therm for a period of one year from the date of the application.

Wandsworth, Wimbledon, and Epsom District Gas Company.

The Company have applied to the Board of Trade under the Gas (Amending Orders) Rules, 1926, for an Amending Order providing for the revision of the powers of charging authorized by substituting for the standard prices of 14d. and 12d. per therm standard prices of 15·6d. and 13·6d. per therm respectively. The undertakers propose that the substituted standard prices shall operate as from the date of the application until June 30, 1927, or until Dec. 31, 1927, if the present coal stoppage and its effect last for a longer period than six months.

SMOKE ABATEMENT IN SALT LAKE CITY.

In the course of an article appearing in the pages of "Coal and Coal Trade Journal," Mr. H. W. Clark, who is Chief Deputy Smoke Inspector of Salt Lake City, recounts the work that has been done there, and the success that has attended it in the direction of the elimination of smoke. From what he says, it appears that the only problem in this connection with which the city is now faced is that of doing away with smoke from residences. Up to the present only a small portion of the city has been tackled by "residence inspectors;" but where it has been, a noticeable improvement has occurred.

During five years' work on industrial plants, much has been learned about the possibilities of smoke abatement and of just what results may be obtained. It is known now that all industrial plants using coal for the production of steam or heat can be operated economically without producing smoke in sufficient quantities to violate a reasonable Smoke Ordinance. It is known also that all heating plants larger than for residences, and those of all the larger residences, can be so constructed and installed that high-volatile bituminous coal can be burned without appreciable smoke.

PROCEDURE RECOMMENDED.

The officials at Salt Lake City believe that on the following lines they have developed a procedure in smoke abatement work which will be effective in accomplishing results quickly and economically:

(1) Every plant in the city is investigated in detail by an experienced engineer, and every measurement and every bit of information that will have a bearing on the case is obtained. The load on the plant must be accurately determined, and this will decide to some extent the type of furnace changes to be made.

(2) The information obtained is studied carefully, so that the most economical and successful solution possible can be arrived at. This solution is worked out in detail, and in such a manner that there is absolute certainty of the desired result being obtained. The next step is to get the owner to have the necessary changes carried out. As most ordinances usually do not make it mandatory upon the plant owner to undertake changes that are requested by the Smoke Department, it usually becomes necessary to persuade him to do so. Frequently the assurance of increased economy which can be given the plant owner is a great help in inducing him to make the changes.

(3) After all plants have been altered to put them in condition to operate without smoke, it is necessary to patrol and supervise them continuously. The amount of supervision required depends entirely upon the kind of men operating the plants. With many plants, it will not be necessary to go near them except on very rare occasions, while others will require visits almost daily.

(4) During the summer the plants must be inspected periodically, to maintain them in proper operating condition. Brickwork needs repairs at frequent intervals, smoke pipes become leaky, and chimneys and combustion chambers get full of ash. In many cases the owner will not have the work done unless the necessity is brought to his attention.

It will be seen that a Smoke Abatement Department must be a permanent part of any city government where smoke is troublesome, and a smoke abatement campaign must be continuous if the city's atmosphere is to be kept clear. If things are let go just for one season, conditions will grow worse, and much of the progress made in the preceding years will be lost in a short time.

RESULTS OF CAMPAIGN.

The results of the campaign in Salt Lake City to date might be briefly summarized as follows:

(1) The production of smoke from plants in the industrial and business districts has been reduced 96 p.ct. since the winter of 1919-20.

(2) The number of hours during which light or dense smoke conditions existed have been reduced 33 p.ct. and 63 p.ct. respectively.
(3) The business district, formerly the centre of the smoke cloud, is now the clearest part of the city.
(4) The smoke from railway locomotives has been reduced very materially, although definite figures as to the reduction are not available. Much improvement can still be made when all locomotives are fully equipped to comply with the ordinances.

COAL TRADE IN THE MIDLANDS.

From Our Local Correspondent.

The position as regards house coal has eased during the week. More men are back in Warwickshire and Staffordshire, and with a continuance of hot weather the immediate needs of householders are easily met. The coal coming through is simply screened, no effort being made to grade it. Industrialists continue to experience considerable difficulty in getting supplies, particularly of the kind of fuel they want. A lot of it, though good enough for steam raising, or for processes where quality and length of flame are not of vital importance, is unsuitable for many engineering processes. Production has accordingly become deranged. The stringency in slacks is as pronounced as ever. Public utility services have prior claim, and the collieries themselves use considerable quantities, so that the limited output does not leave a great tonnage for the open market.

YORKSHIRE AND LANCASHIRE COAL TRADE.

From our Local Correspondent.

The key industries have sufficient stocks of coal to last them for a considerable time; and though there is congestion at the various nearer Continental loading ports and some difficulty in regard to prompt discharge of cargoes on this side, there is a sufficient quantity of coal available to prevent uneasiness. Public utility works are being well served in this respect. Gas coal of excellent quality is available from America and Westphalia at figures which have remained steady during the past month. Silesian coal appears to be giving more satisfaction for steaming purposes.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Aug.* 16.

There is not much change to record in tar products.

A little more interest is being displayed in pitch, but ideas of values are rather wide. The price to-day is probably in the neighbourhood of 90s. per ton f.o.b. makers' works.

Creosote is firm at about 7⅝d. per gallon net and naked at works.

Tar spirits continue in demand.

Pure toluole is firm at about 3s. 3d. per gallon, and pure benzole from 3s. to 3s. 3d. per gallon. Solvent naphtha is unchanged at about 2s. 3d. per gallon for 95/160 quality.

Tar Products in the Provinces.

Aug. 16.

There is nothing of particular note to report respecting markets for tar products.

Pitch and creosote remain very firm, and high prices are generally asked.

White products are in fair demand, and supplies are getting shorter.

The average values for gas-works products during the week were: Gas-works tar, 66s. to 71s. 6d. Pitch, East Coast, 92s. 6d. to 95s. f.o.b. West Coast—Manchester, 87s. 6d. to 90s.; Liverpool, 90s. to 92s. 6d.; Clyde, 93s. to 94s. Benzole, 90 p.ct. North, 1s. 11d. to 2s.; crude, 65 p.ct. at 120° C., 1s. 4d. to 1s. 5d., naked at makers' works; 50-90 p.ct., naked, North, 1s. 11d. to 2s. Toluole, naked, North, 1s. 11d. to 2s. nominal. Coal-tar crude naphtha, in bulk, 9d. to 9¼d. Solvent naphtha, naked, North, 1s. 9d. to 1s. 10d. Heavy naphtha, North, 1s. 1d. to 1s. 2d. Creosote, in bulk, North, liquid, 6¾d. to 7d.; salty, 6¼d. to 6¾d.; Scotland, 6¼d. to 6¾d. Heavy oils, in bulk, North, 7¼d. to 7½d. Carbolic acid, 1s. 4d. to 1s. 5d. prompt. Naphthalene, £11 to £14; salts, 90s. to 100s., bags included. Anthracene "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

Manchester District Tar Prices.

The average price realized in the Manchester district for the sale of tar, according to the sliding-scale, for the month of June was £3 6s. 9·65d. per ton.

South Shields Gas Company.—The following are the dividends for the half-year ended June 30: On the consolidated stock, 4½ p.ct.; on the new stock, 4¼ p.ct.; and on the ordinary stock, 2⅞ p.ct., all less income-tax.

Bath Gas Light and Coke Company.—On Aug. 5, at the Bath County Court, Albert Clark sued the Bath Gas Company for the sum of 14s., which, he alleged, had been overcharged. Plaintiff's case was that in January he complained of the failure of his gas supply, and an employee who was sent to investigate the complaint knocked the meter against something, causing the index hands to make a number of extra revolutions. The employee referred to said this would be an impossible happening, and the plaintiff admitted certain inaccuracies in his letter to the defendants. Without calling on the defendants' advocate, the Judge said he found the claim absolutely unfair. There would be judgment for the defendants.

TRADE NOTES.

Lighting Trades Limited.

This firm, of 51-57, Garratt Lane, Wandsworth, S.W.18, have published their new season's gas catalogue. This is profusely illustrated and excellently printed.

Spiral Holder for Portishead.

The Portishead Gas Company, Ltd., have placed an order with Messrs. Firth Blakeley, Sons, & Co., Ltd., of Church-Fenton, Yorks, for a new double-lift spiral gasholder and steel tank of 125,000 c.ft. capacity.

Spiral-Guided Gasholder for Bolsover.

The Bolsover Gas Light and Coke Company, Ltd., have let a contract to Messrs. Robert Dempster & Sons, Ltd., of Elland, for a two-lift spiral-guided gasholder, with outer lift 52 ft. 9 in. diameter by 18 ft. deep, working in a steel tank. The holder is to be fitted with the "Elland" patent ball carriages and rails.

Waste-Heat Boilers for Beckton.

The Gas Light and Coke Company have placed an order with the Woodall-Duckham Vertical Retort and Oven Construction Company (1920), Ltd., for four waste-heat boilers, to work in conjunction with horizontal retorts in two of the retort houses at the Beckton Gas-Works. These waste-heat boilers will have a total gross steam-raising capacity of over 52,000 lbs. of steam per hour at 160 lbs. per sq. in. and 200° Fahr. added superheat. The installation is complete with all necessary equipment, including feed water heaters, feed water pumps, turbo-driven fans, and superheaters.

Increasing the Throughput of Continuous Verticals.

The report of H.M. Fuel Research Board on the "Carbonization of Coal in Continuous Vertical Retorts"—see "JOURNAL" for Aug. 4, p. 256—has interested Mr. W. Everard Davies. In a letter which he has forwarded on this subject, he suggests that, as at present constructed, vertical retorts offer little room for improvement regarding increased throughputs. The solution to the difficulty, he thinks, is to have "an offtake situated not at the top of the retort, but centrally, so as to receive the distillate after a short and quick transverse passage through the plastic layers and uncarbonized cores of the charge."

Airdrie Gas Department.

In his annual report for the past year, Mr. A. Kellock, the Engineer and Manager, states that the amount of gas made was 146,625,000 c.ft. compared with 139,859,000 c.ft.—an increase of 6,766,000 c.ft., or 4·83 p.ct. The total quantity of gas sold was 138,619,400 c.ft.—an increase of 3·47 p.ct. Both ordinary and prepayment meters showed an increase, while industrial meters consumed 15,029,100 c.ft., compared with 14,021,600 c.ft.—an increase of 7·18 p.ct. Public lamps consumed 8,902,400 c.ft.—an increase of 3·88 p.ct. Deducting the total expenditure under revenue account, amounting to £27,802, from the total income, amounting to £36,055, there was a surplus balance of £8253 to be carried to the credit of the net revenue account to meet the annual standing charges. The total expenditure under net revenue account was £8324. The amount at the credit of the account being £8570 (inclusive of a credit balance of £262 brought forward from last year), a credit balance of £246 remained to be carried forward to next year. The report was submitted to the Town Council on Monday, Aug. 9; and it was decided to increase the price of gas by 3d. per 1000 c.ft., or 0·7d. per therm, making the price 4s. 7d. per 1000 c.ft.

National Institute for the Blind.

The annual report of the National Institute for the Blind (Headquarters: 224-28, Great Portland Street, W. 1) for the financial year ended March 31, 1926, is a unique and most interesting document. The report has been compiled on new lines. The first part is an account of the actual work accomplished during the year, including details of the Institute's endeavour to link-up national and local work, and of the scheme now adopted by the Institute, with the approval of the Ministry of Health, to ensure that the distinctions "national" and "local" indicate relationship and not rivalry. The second part of the report is divided into sections each illustrative of some phase of work for the blind. "Let there be Light" is a short history of the growth of the National Institute from 1868 to 1926. Under the heading "Fingers that See" a full account is given of how the blind are supplied with embossed books and periodicals in Braille and Moon types. "The Solace of Song" deals with the only art—that of music—in which the blind can excel and in which they can find unalloyed pleasure. "Science in the Blind World" treats of technical and research work and the provision of apparatus; while "Helping the Blind of London" describes the work of the Greater London Fund, the great central fund for the blind of the metropolis. "Sunshine" is a vivid description of life at the Sunshine Homes for Blind Babies; and the succeeding section gives a corresponding account of life at Chorley Wood College, the only college in the kingdom for blind girls. How blind men and women, by entering the massage profession, can transform blindness into an asset is described in "Healers of the Sighted." "Helping the Blind to Help Themselves" deals with blind home workers. Various homes for the blind are described in the next section, while "At Work and at Play" affords illuminating glimpses into the world of the blind, describing their professions and occupations and how they spend their leisure hours. From this brief list of contents it will be seen that the report covers a very wide field, and possibly conveys a better and more faithful idea of life in the blind world than any other publication.

South Suburban Gas Company.—The Directors of the Company have declared a dividend on the 5 p.ct. ordinary stock for the half-year ended June 30 at the rate of 6½ p.ct. per annum.

Redhill Gas Company.—The following dividends have been declared for the half-year ended June 30. On the cumulative preference stock, 6 p.ct. per annum; on the preference "A" stock, 5½ p.ct.; and on the ordinary "B" stock, 5½ p.ct.

Bridport Gas Company, Ltd.—Excellent working results are recorded for the year ended June 30; and the Directors recommend dividends at the rates of 5 p.ct. on the "A" preference, 6½ p.ct. on the "B" cumulative preference, and 10 p.ct. on the ordinary shares, less tax. This will leave a balance of £577 to carry forward.

Results at Hereford.—Presenting the report of the Gas Committee to the Hereford City Council, Alderman Witts said that the results were highly satisfactory. The gross profit was £6259, against £3195 for the previous year. They would have a balance to put to revenue account of £1732, against a loss last year of £1530.

Barnsley Gas Company's Dividend.—The Directors of the Barnsley Gas Company recommend that, in addition to the interim dividend paid on March 1 last, a further dividend be paid on Sept. 1 of 7 p.ct. on the general capital stock and "F" shares, 3 p.ct. on the "C" preference shares, and 4 p.ct. on the "D," "E," and "G" shares, less tax in each case.

Gas Prices Increased at Stalybridge.—To meet the increased cost of imported coal, the Stalybridge Gas Committee have raised the price of gas by 6d. per 1000 c.ft. It was stated at the Council meeting that the Corporation had had to pay £3 per ton for coal, against £1 prior to the dispute. With the increase, the price of gas in Stalybridge is now 3s. 6d. per 1000 c.ft.

Cleveland Gas Company.—The Company's profit for the half-year to June 30 was £905; and this (with the amount of £2884 brought into account) it is proposed to carry forward. The state of the iron, steel, and mining industries, as well as the prospect of trade in the Company's area of supply, are so bad, owing to the coal strike, that the Directors consider it advisable to leave the question of dividend over until the results of the current half-year's working are known.

Increase in Price of Gas at Grantham.—At the 104th half-yearly meeting of the Grantham Gas Company, the Directors reported a credit balance of £3457, and they recommended the payment of a dividend at the rate of 5 p.ct. per annum, less income-tax, absorbing £1600, and carrying forward the balance to the next account. In consequence of the prolonged strike of miners, it had been found necessary to raise the price of gas as from next quarter by 4d. per 1000 c.ft., to meet the greatly increased price of coal.

Newcastle (Staffs) Gas Undertaking.—The annual statement of accounts shows a net profit during the year of £1582, bringing the total balance of revenue account to £2595. The Chairman of the Gas Committee (Mr. Hollins) said he did not recommend any reduction in the price of gas. Immediately industrial conditions became settled, the position would be reviewed. The coal trouble had cost the Department, in commitments, £750, which was equivalent to a reduction in the price of gas of 3d. per 1000 c.ft.

Maidstone Gas Company.—The accounts for the year ended June 30 show that, after providing for all fixed charges (including £2000 depreciation of stoves and fittings), there remains an available balance of £19,366; and the Directors recommend payment of a dividend at the rate of 8½ p.ct. for the year, in respect of which an interim dividend at the rate of 4 p.ct. was paid. The sum of £2552 has been transferred to the reserve fund, and £1511 to the renewal fund. The sales of gas exceeded those of the previous year by nearly 75,000 therms, or 3·68 p.ct. Owing to the stoppage in the coalfields, the Directors have been compelled to buy a certain quantity of foreign coal at enhanced prices.

Waterford Gas Company's Excursion to London.—On Friday evening, July 23, the men employed by the Waterford Gas Company started on an excursion to London. On Sunday morning they were back again in their home town. This is the most ambitious excursion of its kind of which we have heard; and that it was in every way a huge success says a great deal for the excellent work of Mr. F. J. Edmonds, the Manager of the Company, who was responsible for the organization of the trip. Eight hours out of the 36 were spent in London, during which short time the energetic voyagers were able to visit a London revue, as an offset to the more serious programme of sightseeing.

Camborne Gas Company, Ltd.—The annual meeting of the Company was held on Friday, Aug. 13. In moving the adoption of the report, Mr. S. J. Ingram, Vice-Chairman and Managing Director, said it was gratifying to record a further increase in gas sales. The net result of the year's trading was a profit of £1242. The Board had secured the freehold of new property for the provision of showrooms, and had under consideration a scheme for the modernization of the premises and the provision of up-to-date showrooms and offices worthy of the Company. Mr. W. C. Vine moved the declaration of a dividend of 6 p.ct. (less income-tax); and this, after being seconded by Mr. S. Stephens, was carried.

Romford Gas and Coke Company, Ltd.—The statement of accounts of the Company for the half-year ended June 30 shows that, after carrying the revenue profit of £10,348 to the profit and loss account, there is a total available balance of £11,411. Out of this the Directors recommend that the following dividends be declared for the half-year: On the "Original" shares 7¼ p.ct., on the "B" shares 5¾ p.ct., on the 6 p.ct. preference shares 3 p.ct., and on the 5½ p.ct. preference shares 2¾ p.ct., all less income-tax. This, together with the amount required for reserve fund, debenture interest, and other charges, will absorb £9190, leaving £2221 to be carried forward to the credit of the current half-year. The sale of gas shows an increase of 10·57 p.ct. over the corresponding period of 1925. The Directors report with regret the death of their Chairman, Mr. Henry Johnson.

Price of Gas at Perth.—At a meeting of the Perth Town Council, Bailie Stewart stated that the coal strike was costing the Corporation £600 more per week to carry on at the gas-works. The price of gas, he said, would be increased by 4d. per 1000 c.ft., bringing it up to 4s. 6d. per 1000 c.ft. The extra cost of coal, due to the strike, had made them spend £3000 in excess of their contract prices.

Hawick Gas Company's Losses.—At the annual meeting of the Hawick Gas Light Company, the Directors reported that the sales of residuals amounted to £1569, compared with £5480 last year. In consequence of irregularities, there had been an independent valuation of the stocks on hand, and this revealed an over-estimate of £4726. Taking the stocks as revalued, the accounts showed a loss on the year's working of £3918. It was resolved to continue the price of gas at 4s. 6d. per 1000 c.ft.

Bridgnorth Gas Supply.—At a meeting of the Bridgnorth Town Council, the Gas Committee reported an increased make, and that the reducing amount of coal in stock was now causing considerable anxiety, as there seemed no prospect of obtaining further supplies for some time. The Mayor (Mr. H. G. Horne), as Chairman of the Committee, said he had been urged by the Manager of the gas-works to impress upon consumers the importance of the strictest economy in the use of gas. The shortage of coal for domestic purposes had considerably increased the calls upon gas, especially for heating and cooking. In consequence of the large stock of gas coal at the commencement of the strike, the supply of gas had not been restricted, but the time was rapidly approaching when the store of gas coal would be exhausted.

Shrewsbury Gas Light Company.—The Directors, in their annual report, state that the profit on the year's working amounts to £8334. After allowing for the interim dividend of 2½ p.ct. (less tax) paid in March last, and the interest on mortgages for the year, the net balance of profit and loss account available amounts to £9713. The Directors recommend that a final dividend of 3½ p.ct. (less tax), making 6 p.ct. for the year, be declared. The reserve fund now stands at £13,575, and the special purposes fund amounts to £5528. There has been an increase of over 9 million c.ft. in the sale of gas during the year. The large stock of coal held by the Company has enabled the supply of gas to be continued during the coal dispute, and the management hope to be able to carry on until the resumption of normal supplies. The number of cookers on hire at June 30 was 4656, together with 1751 fires.

The Gourock Town Council have decided to increase the price of gas by 6d. per 1000 c.ft., making it 4s. 8d.

Owing to the coal strike, the Bethesda Council have decided to increase the price of gas to 5s. 8d. per 1000 c.ft.

On July 26, the Blackburn Corporation Gas Department sold 40 gas cookers and 11 gas boilers at their central showroom.

On account of the coal strike, the Seascale (Cumberland) Gas Company are turning-off their supply of gas from 8 p.m. to 7 a.m.

Permission has been granted the Doncaster Town Council by the Ministry of Health to borrow £33,100 for the proposed new plant, mains, &c.

The Oswaldtwistle Gas-Works Committee have decided to purchase a quantity of coal, to be sold for domestic purposes. The amount is 50 tons per week.

At a recent meeting of the Newport Town Council, Councillor Young said it might be necessary, in the existing circumstances, to increase the charge for gas—at present 4s. 2d. per 1000 c.ft.

The report which was submitted at the recent annual meeting of the Hebden Bridge Gas Board showed a net loss of £1820 on the past year's working; and this in face of a record output. The quantity of gas manufactured was 119,075,000 c.ft.—an increase of 1,756,000 c.ft. on the previous year.

The Belfast Corporation are making application to the Northern Ministry of Home Affairs for sanction to a loan of £150,000 for the following purposes: Mains, £50,000; services, £10,000; stoves, £25,000; meters, £15,000; vertical retorts, £30,000; and plant and machinery, £20,000.

The employees of the Houghton-le-Spring District Gas Company enjoyed their first annual outing on Aug. 2. Accompanied by Mr. G. W. Martin, the Manager, they travelled by motor-coach to Redcar, where lunch was provided. The Directors of the Company contributed to make this part of the trip a marked success.

The reserve coal supplies of the Leeds Corporation Gas Department are practically exhausted, and there is a possibility that the price of gas will have to be increased, owing to the higher price of foreign coal. The Gas Committee have bought a large quantity of American coal, the price of which is nearly double that of the supply in normal times.

At a meeting of the Darwen Town Council on Aug. 5, Councillor Pickup, Chairman of the Gas Committee, expressed regret that the gas supply of the town, owing to the coal strike, had been indifferent. There had been an exceptional demand. A full supply had been given, and he hoped that it would be maintained. It was decided to purchase 600 tons of foreign coal.

At a meeting of the Blackpool Council there was proposed an amendment to a decision of the Gas Committee increasing the price of gas by 5d. per 1000 c.ft. Councillor Tomlinson, Chairman of the Gas Committee, said the advance would affect ordinary and power users, but would not apply to prepayment consumers. It was due solely to the strike. Councillor Ashton pointed out that it was the settled policy of the Committee to charge 4d. per 1000 c.ft. less to power consumers than to ordinary consumers, and they had made a mistake by increasing the ordinary person's charge. The concession to traders for power was a good one, but they must not forget that boarding-house keepers represented one of the most important undertakings in their midst. Yet they had to pay the ordinary rate, and not the power scale. The amendment was defeated.

STOCK MARKET REPORT.

WITH the holiday in full swing, it was only to be expected that business on the Stock Exchange last week would be on the quiet side; in fact, dealers, especially in the Rubber Market, complained bitterly of the lack of inquiries. The gilt-edged market was, however comparatively busy; money being invested in these securities which, but for the long drawn-out coal stoppage, would have been available for industrial investments. On the whole, prices were firm; the impression being that some sort of settlement of the dispute was at last in sight. The popular shares —especially Tobaccos—were encouraged by the repetition of bonus rumours. There was a distinct improvement in Home Rails.

The Gas Market was fairly satisfactory, and, excluding *ex* div. reductions, there were no values marked down during the week. On the other hand, British ordinary rose 1 point, Imperial Continental capital 2 points, and Primitiva ordinary 3d. Transactions recorded were normal, but these were a very small proportion of the actual sales. Attention is called to the low price of the Commercial Company's two capital stocks. It is rumoured that there will be no opposition to the Company's application to the Board of Trade for a temporary increased standard.

The following transactions were recorded during the week:

On Monday, Continental Union 28¼, Gas Light and Coke 83¾, 84, 84½, 84⅜, 85, 3½ p.ct. maximum 60, 4 p.ct. preference 76½, Imperial Continental 120, 121, 122, 122½, 123, 3½ p.ct. debenture 69½, Liverpool 7 p.ct. preference 102½, Primitiva 9s. 6d., 9s. 7¼d., 9s. 11¼d., South Metropolitan 93, 93⅛, 93⅜, 88½, 89½, 4 p.ct. debenture 73¼. Supplementary prices, Croydon 4 p.ct. debenture 73, Gas Light and Coke 5 p.ct. debenture 99, Guildford 96½, 97, Horley district (7 p.ct.) 93½, 94, Reading 5 p.ct. 91½.

On Tuesday, Bombay 20s. 3d., Bournemouth 7 p.ct. 12⅜, European 5, Gas Light and Coke 84¼, 84⅜, 85, 3½ p.ct. 60¼, 60⅜, 61, 3 p.ct. debenture 58½, 59½, Imperial Continental 121, Montevideo 80¼, Primitiva 9s. 6d., 9s. 10½d., 4 p.ct. (River Plate) debenture 66¼, 66¾, South Metropolitan 6½ p.ct. debenture 103⅞, South Suburban 5 p.ct. 99.

On Wednesday, Alliance and Dublin 78¾, Bournemouth 6 p.ct. preference £11 5s. 9d., 11⅜, 11⅞, British 102, Commercial 3 p.ct. debenture 56¼, 59½, European 95s., Gas Light and Coke 84, 84¼, 84⅜, 4 p.ct. preference 76½, Imperial Continental 123, 124, Liverpool 7 p.ct. preference 103½, Primitiva 9s. 9d., 9s. 10½d., 10s., South Metropolitan 93⅛, 3 p.ct. debenture 59½, Swansea 7 p.ct. preference 102¼. Supplementary prices, Gas Light and Coke 5 p.ct. debenture 99.

On Thursday, Alliance and Dublin 79⅞, Gas Light and Coke 82¼, 82⅜, 82⅞, 83⅛, 84½, 84⅝ *ex* div., 3½ p.ct. maximum 59, 59⅜, 60⅛ *ex* div., 3 p.ct debenture 59¼, Imperial Continental 123½, 124¼, Primitiva 10s. 3d., 4 p.ct. 1st debentures 84½, South Metropolitan 91¼ *ex* div., South Suburban 5 p.ct. 96 *ex* div. Supplementary prices, Bournemouth 7 p.ct. debenture 104½, 105, Southend and District 5 p.ct. new "B" 80.

On Friday, Bournemouth 4 p.ct. debenture 76, British 102, Commercial 3½ p.ct. 77, Gas Light and Coke 82⅞, 82⅞, 83¾, 83½, 85¼, Imperial Continental 123, 124½, 124⅞, Primitiva 10s., 10s. 4½d., South Metropolitan 91¼, South Suburban 5 p.ct. debenture 93½, 94, Tottenham "B", 89½. Supplementary prices, Gas Light and Coke 5 p.ct. deb. 99.

Money was dearer in Lombard Street at the end of the week. The rise from 3½ p.ct. to 4 p.ct. in the re-discount rate of the New York Federal Reserve Bank caused discount quotations to be raised, and Treasury Bills were allotted at £4 10s. 4·04d. p.ct., an increase of slightly over 3s. p.ct. on the average for the previous week. It is not expected, however, that the Bank Rate will be raised.

The feature of the Foreign Exchange market was a fall in the value of sterling, the closing quotation on Friday being 4.85$\frac{27}{32}$; and an unsettling influence was a rise of 6 points in the Belgian Exchange, which closed at 182. French francs were weaker at 178⅞, and Italian lire were a shade cheaper at 147⅞.

Silver declined on the rise in the Japanese exchange, and closed at 28⅝d. per oz. Gold was ¼d. cheaper at 84s. 11¼d. per oz.

The Bank Rate is 5 p.ct., to which it was raised from 4 p.ct. on Dec. 3. Bankers' deposit rates are 3 p.ct. The deposit rates of the discount houses are 3 p.ct. at call and 3¼ p.ct. at notice.

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf.Yr	Dividends. Last Hf. Yr	NAME.	Quotations. Aug. 13.	Rise or Fall on week.	Transactions Lowest and Highest Prices.
£			% p.a.	% p.a.				
171,978	Stk.	Aug. 12	5	5	Aldershot 5 p.c. max. C.	72—75•		
322,992	"		4	4	Do. 4 p.c. Pref.	65—70*	−2	..
1,551,868	"	Apl." 1	6½	6½	Alliance & Dublin Ord.	75—80	−2	..
374,000	"	July 8	4	4	Do. 4 p.c. Deb.	60—65	..	..
300,000	1	May 6	1/7⅞	1/7⅞	Bombay, Ltd.	⅞—1 1/16	..	78⅞—79¾
170,000	10	Mar. 4	8½	8½	Bournemouth 5 p.c.	12—13	..	20/3
500,050	10	"	7	7	Do. B 7 p.c.	12—12½	..	..
275,000	10	"	6	6	Do. Pref. 6 p.c.	11—12	..	12⅜
50,000	Stk.	June 24	3	3	Do. 3 p.c. Deb.	54—57	..	..
162,025	"	"	4	4	Do. 4 p.c. Deb.	74—77	..	£11/5/9—11.7/16
214,740	"	Mar. 18	12	12	Brighton & Hove Orig.	167—172	..	76
244,200	"	"	9	9	Do. A Ord.	128—133	..	..
1,387,500	"	July 22	5	5	Bristol 5 p.c. max.	86—87a	..	..
855,000	"	Mar. 18	8	7	British Ord.	100—105	+1	102
100,000	"	June 24	7	7	Do. 7 p.c. Pref.	114—119	..	..
120,000	"	"	4	4	Do. 4 p.c. Red. Deb.	68—73	..	..
100,000	10	June 10	6	8	Cape Town, Ltd.	6¾—7⅛	..	..
100,000	10	Apl. 22	4½	4½	Do. 4½ p.c. Pref.	6—7	..	..
150,000	Stk.	June 24	4⅜	4⅜	Do. 4½ p.c. Deb.	66—71	..	..
626,860	"	July 22	6	6	Cardiff Con. Ord.	94—97	..	..
237,860	"	June 24	7½	7½	Do. 7½ p.c. Red. Deb.	99—102	..	..
157,150	"	Aug. 12	6½	5	Chester 5 p.c. Ord.	88—93b*	−2	..
79,185	1	Apl. 22	†2/-	†2/-	Colombo Ltd. Ord.	28/—30/-	..	..
24,495	1	"	1/4⅜	1/4⅜	Do. 7 p.c. Pref.	20/—22/-	..	..
1,513,380	Stk.	Aug. 12	5⅛	5⅛	Commercial 4 p.c. Cap.	76—79*	−2	..
560,000	"	"	5/8/4	5/8/4	Do. 3½ p.c. Cap.	74—77*	−2	..
475,000	"	June 24	3	3	Do 3 p.c. Deb.	55—58	..	77
800,000	"	Oct. 8	—	4	Continental Union, Ltd.	25—30	..	56½—59½
200,000	"	Mar. 4	7	7	Do. 7 p.c. Pref.	85—88	..	28½
737,150	"	Aug. 12	6½	6½	Croydon sliding scale	94—97*	..	..
403,100	"	"	5	5	Do. max. div.	77—80*	−2	..
492,270	"	Mar. 4	6	5	Derby Con.	107—109c	−2	..
55,000	"	June 24	4	9	Do. Deb.	73—75c	..	..
209,000	"	Mar. 4	5	4	East Hull Ord. 5 p.c.	86—89	..	..
50,000	"	June 24	5	5	Eastbourne 5 p.c. Deb.	91—96	..	..
1,002,180	10	Apl. 1	†6	†1	European, Ltd.	4½—5⅛	..	..
18,788,960	Stk.	Aug. 12	4/17/4	5/1/4	Gas Light & Coke 4 p.c. Ord.	82—84*	−1⅛	82½—85¼
2,600,000	"	"	3½	3½	Do. 3½ p.c. max.	57—60*	−1	59—61
4,157,020	"	June 24	4	4	Do. 4 p.c. Con. Pref.	74—77*	−2	76½
5,602,620	"	"	3	3	Do. 3 p.c. Con. Deb.	58—61	..	58½—59½
181,315	"	—	—	—	Do. 6 p.c. Br'tf'd Rd. Db.	100—105	..	..
130,000	"	"	—	—	Do. 10 p.c. Bonds.	..	..	..
42,000	"	—	10	10	Do. 7½ p.c. Ilford Deb.	..	..	..
82,500	"	Mar. 18	7½	7½	Hastings & St L. 5 p.c. Conv	..	..	..
258,740	"	"	6⅝	6⅝	Do. 3½ p.c. Conv.	88—93	..	..
70,000	10	June 10	5½	5½	Hongkong & China, Ltd.	68—73	..	..
173,200	Stk.	Mar. 4	†10	†10	Hornsey Con. 3½ p.c.	19½—20½	..	..
1,976,000	"	May 20	5	5	Imperial Continental Cap.	69—71	..	..
226,170	"	Feb. 4	10	†10	Do. 3½ p.c. Red. Deb.	120—125	..	..
235,242	"	Aug. 12	3½	3½	Lea Bridge 5 p.c. Ord.	68—71*	+2	120—124½
2,127,340	"	Aug. 12	6½	6½	Liverpool 5 p.c. Ord.	92—97•	−1	69½
600,000	"	Aug. 12	5½	5½	Do. 7 p.c. Red. Pref.	80¼—81¼b	−3	..
165,736	"	Mar 18	7	7	Maidstone 5 p.c. Cap.	102½—104¼b	..	..
63,480	"	Feb. 18	9	8	Do. 3 p.c. Deb.	115—120	..	..
76,000	"	June 24	3	3	Malta & Mediterranean	53—58	..	..
541,920	5	June 24	†6	†7	Montevideo, Ltd.	5⅛—5⅜	..	..
2,051,315	Stk.	May 20	†4	†6	Newcastle & Gateshead Con.	78—81	..	..
360,929	"	Aug. 12	5	5	Do. 4 p.c. Pref.	69½—70*d	−1⅜	80¼
529,705	"	"	4	4	Do. 3½ p.c. Deb.	73—74*d	−1½	..
15,000	"	June 24	3½	3½	North Middlesex 10 p.c.	68—69d	..	..
91,530	"	Mar. 4	11½	11½	Do. 7 p.c.	155—160	..	..
300,000	Stk.	May 6	8 3/20	8 3/20	Oriental, Ltd.	112—117	..	..
188,120	"	June 24	9	7	Plym'th & Ston'house 5 p.c.	96—101	..	..
60,000	50	Mar. 4	7⅞	7⅞	Portsea Island B	108—113	..	..
100,000	50	"	14	14	Do. C	—	..	..
2,289,909	1	—	13	13	Primitiva Ord.	9/6—10/6	+·/3	9/6—10/4½
282,200	100	June 1	—	—	Do. 4 p.c. Red. Deb.	83—85	..	84½
600,000	Stk.	July 22	4	4	Do. 4 p.c. Red. Deb. 1911	65—67	..	..
180,305	"	June 24	4	4	Do. B. Aires 4 p.c. Rd. Db.	65—67	..	..
256,847	"	"	4	4	Do. R'r P'te 4 p.c. Rd. Db.	65—67	..	66½—66⅝
150,000	10	Mar. 18	6	6	San Paulo 6 p.c. Pref.	7⅞—8½	..	..
125,000	50	July 1	6	6	Do. 5 p.c. Red. Deb.	44—47	..	..
270,000	Stk.	Mar. 18	5½	6	Sheffield A	98—100e	..	..
419,968	"	"	5½	6	Do. B	98—100e	..	..
1,047,000	"	"	5½	6	Do. C	98—100e	..	..
90,000	10	June 11	4	—	South African	5—7	..	..
6,609,895	Stk.	Aug. 12	7	5	South Met. Ord.	90¼—92¼*	−2	91½—93¾
1,895,445	"	July 8	3	3	Do. 3 p.c. Deb.	57—60	..	59½
734,000	"	Mar. 4	6½	6½	Do. 6½ p.c. Red. Db.	102—104	..	103⅝
91,500	"	Aug. 12	8½	8½	South Shields Con.	114—116d*	−3	..
1,187,795	"	Aug. 12	6½	6½	South Suburban Ord. 5 p.c.	95—98*	−3	96—99½
368,837	"	June 24	5	5	Do. 5 p.c. Deb.	92—95	..	93½—94
647,740	"	Mar. 18	5	5	South'mpton Ord. 5 p.c.max.	77—80	..	..
121,275	"	June 24	4	4	Do. 4 p.c. Deb.	68—73	..	102½
250,000	"	Mar. 4	7	7	Swansea 7 p.c. Red. Pref.	100—103	..	..
200,000	"	June 24	6½	6½	Do. 6½ p.c. Red. Deb.	99—101	..	88½—89½
120,000	"	July 22	7½	7½	Tottenham District A 5 p.c.	105—110	..	..
882,275	"	"	5½	6½	Do. B 3½ p.c.	87—90	..	..
150,000	"	"	5½	5½	Do. 5½ p.c. Pref.	99—101	..	73½
181,255	"	June 10	4	4	Do. 4 p.c. Deb.	73—76	..	..
258,251	"	Mar. 18	5	5	Tynemouth Con. and New	67½—68¼d	..	..
197,294	"	Mar. 4	6⅝	6⅝	Uxbridge, Maidenhead, & Wycombe 5 p.c.	90—95	..	..
88,330	"	"	5	5	Do. 5 p.c. pref.	82—87	..	..
91,800	"	"	6⅝	6⅝	Do. 5 p.c. Maidenh'd	87—92	..	..
30,000	"	July 8	8½	8½	Wandsworth, Wimbledon, and Epsom—		..	..
255,696	"	"	7	7	Wandsworth A 5 p.c.	122—127	..	..
412,460	"	"	5/19/0	5/19/0	Do. B 3½ p.c.	102—107	..	..
352,000	"	"	6⅝	6⅝	Do. C and New	88—93	..	..
98,000	"	"	7⅛	7⅛	Wimbledon 5 p.c.	98—103	..	..
88,416	"	June 24	3	3	Epsom 5 p.c.	104—109	..	..
					3 p.c. Deb.	54—57	..	..

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